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Understanding the Experience and Evaluating the Occurrence of Depression in a Sample of Pregnant Veterans

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UNDERSTANDING THE EXPERIENCE AND EVALUATING THE OCCURRENCE OF DEPRESSION IN A SAMPLE OF PREGNANT VETERANS

A Dissertation Presented

By

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ABSTRACT

Background: The Veterans Health Administration (VHA) encourages depression screening and treatment for pregnant veterans; however, rates of depression symptoms and treatment utilization during pregnancy have not been well-studied.

Methods: We used data from the *Maternity Care Coordination for Women Veterans* cohort study. Specifically, our aims were to: 1) examine rates and correlates of depression symptoms in a sample of pregnant veterans; 2) understand mental health care treatment utilization and explore the experiences of veterans accessing mental health care at the VHA during pregnancy; and 3) examine VHA mental health provider's perspectives on depression screening and treatment in the perinatal period.

Findings: Depression symptoms were present in 28% of pregnant veterans in our sample. Social support and employment decreased odds of symptoms; history of anxiety, antidepressant use, and active duty service resulted in increased odds of symptoms. Nearly 70% of women veterans with prenatal depression symptoms received at least one mental health visit or antidepressant prescription during pregnancy. However, symptomatic pregnant women without a history of depression were less likely to receive care. Mental health providers identified absence of screening protocols and referral procedures and variability in risk/benefit conversations surrounding antidepressant use as areas of weakness for VHA mental health care during the perinatal period.

Conclusions: Depression symptoms were present in nearly one in every three pregnant veterans. Depression treatment during pregnancy is complex, requiring individualized

care. Policies for depression screening, referrals to providers, and medication review could be better encouraged to improve standardized care across the VHA.

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LIST OF ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists
ADD	attention-deficit disorder
ADHD	attention-deficit hyperactivity disorder
AOR	adjusted odds ratio
BSN	Bachelor of Science in Nursing
CBOC	Community-Based Outpatient Clinic
CDW	Corporate Data Warehouse
CI	confidence interval
CIRB	Central Institutional Review Board
COMFORT	Center for Maternal & Infant Outcomes & Research in Translation
CPT	Current Procedural Terminology
DoD	Department of Defense
EHR	electronic health record
EPDS	Edinburgh Postnatal Depression Scale
FCS	fully conditional specification
HSR&D	Health Services Research & Development
ICD-9 CM	International Classification of Disease, 9th Revision, clinical modification
ICD-10	International Classification of Disease, 10th Revision
LSI	Local Site Investigator
MAOI	monoamine oxidase inhibitors
MAR	missing at random
MCAR	missing completely at random
MCC	Maternity Care Coordinator
MCMC	Markov chain Monte Carlo
LCSW	licensed clinical social worker
MD	medical doctor
MDD	major depressive disorder
MSN	Master of Science in Nursing
MST	Military sexual trauma
MV	multivariable

NaSSA	noradrenergic and specific serotonergic antidepressant
NDDI	norepinephrine–dopamine disinhibitor
NDRI	norepinephrine–dopamine reuptake inhibitor
NP	nurse practitioner
OB/OBGYN	obstetrician/obstetrician gynecologist
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OND	Operation New Dawn
PC-MHI	Primary Care-Mental Health Integration
PHQ	Patient Health Questionnaire
PSSG	Planning Systems Support Group
PTSD	post-traumatic stress disorder
RN	registered nurse
SD	standard deviation
SNRI	serotonin–norepinephrine reuptake inhibitors
SSRE	selective serotonin reuptake enhancer
SSRI	selective serotonin reuptake inhibitors
TCA	tricyclic antidepressants
URH	urban/rural/highly rural
US	United States
USPSTF	United States Preventive Services Task Force
VA	Veterans Administration
VHA	Veterans' Health Administration
VINCI	VA Informatics and Computing Infrastructure

PREFACE

Some of the work presented or related to this dissertation is submitted or currently under review for peer-reviewed publication.

Chapter II is under review as:

Kroll-Desrosiers AR, Crawford SL, Moore Simas TA, Clark MA, Bastian LA, Mattocks KM. Rates and Correlates of Depression Symptoms in a Sample of Pregnant Veterans Receiving Veterans Health Administration Care.

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CHAPTER I: INTRODUCTION

Pregnant Veterans receiving Care from the Veterans Health Administration

Women represent a growing proportion of veterans utilizing Veterans Health Administration (VHA) care. Between 2001 and 2010, the number of women veterans under age 45 receiving services from the VHA nearly doubled,[1] and the number of women receiving VHA benefits is projected to increase further over the next couple of decades.[2] Additionally, the number of reproductive-aged women veterans utilizing VHA benefits to pay for maternity care increased from 12.4 to 17.8 deliveries per 1,000 women veterans from 2008 to 2012.[3]

Despite increasing numbers, women veterans continue to be a numerical minority within the VHA, and it is not cost-effective to employ obstetricians to provide onsite maternity care for pregnant veterans. Instead, nearly all maternity care for veterans is provided by the Veterans Affairs (VA) Community Care program, which pays for prenatal and maternity care coverage at community-based obstetrical providers.[3–5] However, a substantial proportion of veterans continue to receive mental health care within the VHA during their pregnancies.[6] This receipt of care from both VHA providers and community obstetricians creates a fragmented system that may be difficult for pregnant veterans to navigate.

In an effort to encourage care for co-morbid conditions, such as depression, while simultaneously receiving obstetrical care, the VHA issued Handbook 1330.03 with maternity health care guidelines as a tool to manage these challenging systems.[4] Depression screening, diagnosis, and referrals for care are recommended for all pregnant

veterans within these maternity care guidelines.[4] However, to date, little research has been conducted to evaluate the application of these guidelines and the relationship between successful management of mental health care and quality prenatal care for pregnant veterans.

Perinatal Depression among Veterans

Perinatal depression encompasses depressive disorders developing during pregnancy and occurring up to one year postpartum.[7,8] In the general population, incidence rates of perinatal depression are as high as 1 in 5.[9,10] A 2005 systematic review of 59 studies found prevalence rates of 8.5-11% for perinatal depression;[8] however, prevalence estimates within high-risk populations have been estimated to be upwards of 25%,[8–13] with as high as 50% reported.[14] Perinatal depression has been associated with behavior problems and cognitive delays in infants, compromised care giving practices, reduced rates of breastfeeding, maternal sleep problems, and greater suicidal ideation compared to women without depressive symptoms.[15,16] Risk factors for perinatal depression include maternal anxiety, life stress, history of depression, lack of social support, unintended pregnancy, and relationship factors.[17,18]

Estimates of rates of depression in women veterans prior to pregnancy range from 10-60%.[6,19] Roughly half of young female veterans return from military service with some form of disability[1] and conditions such as depression, pain, and PTSD.[19–21] Depression is the most commonly diagnosed medical condition among women veterans ages 18-44.[22] In 2012, a quarter of women veterans utilizing VHA services were

diagnosed with depression and 12.3% of women veterans were diagnosed with a major depressive disorder.[22] This is in contrast to an estimated 9.3% of women ages 18-39 in the general U.S. population diagnosed with depression between 2009-2012.[23] Women veterans are more likely than male veterans to be diagnosed with depression and to use mental health services within the VHA.[24] Women veterans themselves have identified depression care as a high priority issue within the VHA; a survey of women veterans found that improving access to depression care ranked as the highest priority among 15 mental health services.[25]

Despite high rates of depression among women veterans, depression during pregnancy has not been well-studied in this population. . Pregnant veterans, especially those who have served in Operation Enduring Freedom or Operation Iraqi Freedom (OEF/OIF), have higher rates of depression compared to women veterans who are not pregnant.[6,26] However, these rates are based on ICD-9CM or CPT diagnosis codes rather than well-validated self-report measures and likely underestimate the true prevalence of depression during pregnancy in veterans.[6] Women veterans are uniquely challenged by combat-related exposures, military sexual trauma, and post-deployment stressors, all of which may increase the risk for developing perinatal depression compared to the general population.[24] Higher rates of psychiatric conditions, such as post-traumatic stress disorder, may also increase the risk of developing perinatal depression.[24]

Depression Treatment and Management during Pregnancy

It is unclear how women veterans navigate depression treatment during pregnancy. However, care coordination within the VHA has the potential to help pregnant veterans bridge gaps between dual health systems for their care. The Agency for Healthcare Research and Quality defines care coordination as "the deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of healthcare services"[27] to "achieve safer and more effective care."[28] Standards of practice for maternity care within the VHA are specified in Handbook 1330.03, which includes the scope of work for each position involved in the maternity coordination model that is expected to be applied consistently at all facilities.[4] The VHA model was instituted to bridge the gap between the existing dual VHA/non-VHA healthcare systems and designed to "ensure that eligible women Veterans have access to timely prenatal care…(and) seamless coordination of non-VA maternity care with VA care, especially in cases of women Veterans with co-morbid conditions who may require VA care during their pregnancy."[4] Depression screening, assessment, diagnosis, and treatment (both counseling and referrals to further care), are included as components of the maternity health care guidelines. VHA Handbook 1330.03 specifies that "VA providers must screen all pregnant and postpartum women for depression utilizing an appropriate screening tool, and have a system to ensure that positive screening results are followed by accurate diagnosis, implementation of treatment, and follow-up either within the practice or through referral."[4] The VA/Department of Defense (DoD) Clinical Practice Guideline for the Management of Pregnancy is referenced for further details on specific screening tools and referral processes. Depression screenings in

the VA/DoD guidelines are recommended to be conducted "using a standardized tool such as the Edinburgh Postnatal Depression Scale or the 9-item Patient Health Questionnaire periodically during pregnancy and postpartum," with periodic screening defined as once each in the first trimester, third trimester, and postpartum.[29] However, it is still unknown how many women veterans experience depression symptoms during pregnancy and what proportion of those women receive VHA mental health care during their pregnancies. It is also unclear whether VHA providers utilize care coordination within their facility or with obstetrical providers outside their facility to facilitate screening and treatment for perinatal depression.

Our primary focus was to understand the rates and correlates of depression and the utilization of mental health care and depression management during pregnancy in women veterans receiving care within the VHA healthcare system, within the context of VA guidelines in Handbook 1330.03.[4]

Specific Aims

To achieve our objectives, we conducted a mixed methods analysis of qualitative and quantitative data obtained from the *Maternity Care Coordination for Women Veterans* cohort study, conducted in 15 VHA hospitals across the US (VA HSR&D IIR13-81). This mixed methods study is the first to prospectively examine depression symptoms and treatment utilization among a sample of pregnant veterans across several VHA facilities in the US, as well as receive the perspectives of VHA mental health providers working with perinatal veterans. The specific aims of this dissertation were:

Aim 1: To examine rates of perinatal depression symptoms in pregnant veterans:

- Estimate the prevalence of depression symptoms in a sample of pregnant veterans using the Edinburgh Postnatal Depression Scale (EPDS).
- Examine patient-level correlates of depression symptoms, including pregnancy factors, history of co-morbid conditions, and military-related characteristics.

Aim 2: To evaluate the rate of mental health care treatment utilization during pregnancy and to understand the experience and management of depression in a sample of pregnant veterans:

- Identify differences in treatment utilization during pregnancy by women veterans who report past diagnoses of depression compared to those with no past diagnosis.
- Explore the decisions women veterans make regarding antidepressant use during pregnancy.
- Examine whether pregnant veterans discuss medication risk counseling with their VHA and/or obstetrical providers.

Aim 3: Explore the experiences of VHA mental health providers within the context of policy recommendations for seamless care coordination and treatment management for pregnant and postpartum veterans:

- Understand typical mental health care and treatment experiences for perinatal veterans from the perspective of the mental health care provider.

- Examine if care coordination occurring at and within VHA facilities promotes consistent care for veterans in VHA mental health care and non-VHA obstetrical care.

Overview of Study Population and Data Sources

All data was obtained from the *Maternity Care Coordination for Women Veterans* project (VA HSR&D IIR13-81), as part of the Center for Maternal & Infant Outcomes & Research in Translation (COMFORT) study at the VA Central Western Massachusetts. Pregnant women veterans and mental health providers were enrolled into the study from 15 VHA sites across the US (Figure 1.1). These 15 sites were purposively chosen to represent facilities that 1) provide a mix of delivery rate, based on prior work[3] identifying the number of deliveries per facility to women veterans utilizing VHA benefits (high: >150 deliveries/year; medium: 50-149 deliveries/year; low: <50 deliveries/year); 2) allow for regional diversity; 3) encourage racial diversity of women veteran participants; and 4) have membership in the Women's Practice-Based Research Network, a VA-funded network of VHA facilities that provide care for a substantial number of women veterans and have lead site investigators willing to support COMFORT recruitment.

Pregnant veterans receiving care at one of the 15 preselected VHA sites were contacted following their VHA pregnancy confirmation visit (a visit required to initiate the start of VHA maternity care benefits[4]) and invited to participate in COMFORT. This sample of pregnant veterans provided the data for **Aims 1 and 2** (Chapters II and III). Eligible participants were 1) currently pregnant; 2) a veteran (not in active duty); 3)

receiving maternity care through VHA benefits and/or another insurance plan (e.g., private insurance, Medicaid); and 4) English speaking. No participants were under the age of 18 because this is the youngest age of enlistment; there were no additional exclusion criteria.

Contact information for veterans confirmed to be pregnant was shared with COMFORT research staff by local site investigators. Pregnant veterans were invited to participate in COMFORT via mailed recruitment packets that included an invitation letter. These invitation letters described the study and invited the veteran to opt-in by calling a toll-free number to receive further information. Research team members followed up with telephone calls to potential participants who did not respond to the study invitation. If eligibility criteria were met, two telephone surveys were scheduled with the woman veteran: one during the second or third trimester (ideally around 20-24 weeks of gestation) and a second within three months after delivery. Participants were reimbursed $50 for each survey. This dissertation utilizes data collected during the first survey (*i.e.*, during pregnancy).

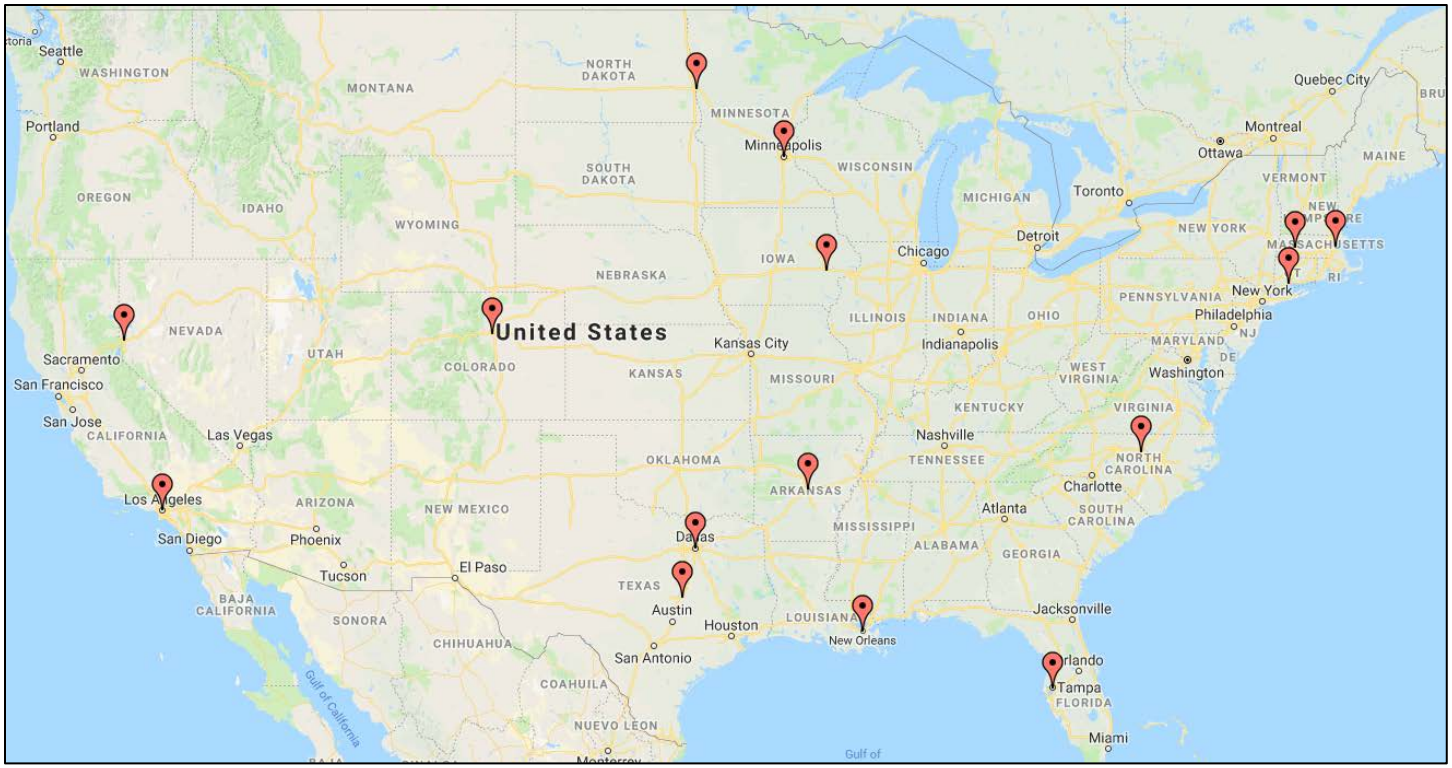
The telephone survey collected data on sociodemographic characteristics, military service, health status, healthcare utilization, social support, and pregnancy related factors. The 10-item Edinburgh Postnatal Depression Scale (EPDS) was also administered.[30] Study data were collected and managed using REDCap (Research Electronic Data Capture), a secure, web-based application designed to support data capture for research studies.[31] Additionally, electronic health record (EHR) data on service-connected disability status, date of birth, past medical diagnoses, healthcare utilization, and

antidepressant prescriptions were obtained on our participants from VA Corporate Data Warehouse (CDW) administrative data. The CDW is a repository of data updated nightly from the VHA electronic medical records system for operations and research use.[32]

COMFORT was approved by the Veterans Administration Central Institutional Review Board (CIRB) and was given a waiver of written consent so that signed consent forms were not required from participants. Our sample for Chapters II and III included participants enrolled within the first two years of COMFORT (January 28, 2016 – February 6, 2018), when the initial enrollment goal of 500 participants was met.

VHA mental health providers affiliated with the enrollment sites and who were involved in the care of perinatal women veterans provided the data for **Aim 3** (Chapter IV). Our sample was purposively selected, with the goal to interview at least one, but ideally two or more, mental health providers at each of the COMFORT study sites. The local site investigators for the COMFORT study provided contact information for potential mental health providers at their respective site; additionally, several mental health providers were referred to COMFORT research staff directly by interviewees. After receiving mental health provider contact information, COMFORT research staff connected with mental health providers via email to provide information on the study, the topics to be covered, and to schedule interviews. The interview guide utilized for the study (Appendix 4.1) was developed by COMFORT investigators and refined after pilot interviews. Interviews took place between August 2017 and February 2018.

Figure 1.1: Map of COMFORT Sites



CHAPTER II: RATES AND CORRELATES OF DEPRESSION SYMPTOMS IN A SAMPLE OF PREGNANT VETERANS RECEIVING VETERANS HEALTH ADMINISTRATION CARE

ABSTRACT

BACKGROUND: Depression is the most commonly diagnosed medical condition among women veterans ages 18-44; however, depression during pregnancy has not been well-studied in this population.

METHODS: Pregnant veterans were recruited from 15 Veterans Health Administration sites across the US; our sample included 501 participants. Sociodemographic characteristics, military service, health status, and pregnancy related factors, as well as the Edinburgh Postnatal Depression Scale (EPDS) were collected as part of a telephone survey. Additional data were obtained from electronic health record data. We used multivariable logistic regression models to examine factors associated with an EPDS score suggestive of clinically significant depressive symptoms (≥10).

FINDINGS: Prenatal EPDS ≥10 were calculated for 28% of our sample. Our final model indicated that veterans having spousal or partner support during pregnancy decreased odds of an EPDS ≥10 by 65% compared to veterans reporting no spousal or partner support. Veterans reporting being employed reduced the odds of an EPDS ≥10 by 60% compared to those reporting being unemployed, a homemaker, or a student. A past diagnosis of anxiety, past antidepressant use, and active duty service all resulted in increased odds of an EPDS ≥10.

CONCLUSIONS: This is the first quantitative estimate of depression symptoms in pregnant veterans. The prevalence of depression symptomology was greater than the high end of prevalence estimates in the general pregnant population. Given that the risk of depression increases during the postpartum period, women who can be identified with depressive symptomatology during pregnancy can be offered critical resources and support prior to birth.

BACKGROUND

Depression is the most commonly diagnosed medical condition among women veterans ages 18-44.[22] In 2012, close to 40,000 (25%) women veterans utilizing VHA services were diagnosed with depression and 12.3% of all women veterans were diagnosed with a major depressive disorder.[22] This is in contrast to an estimated 9.3% of women ages 18-39 in the general U.S. population diagnosed with depression between 2009-2012.[23]

In general, 1 in 7 women experience depression in pregnancy and the postpartum period thus making depression the most common complication of pregnancy.[33] Yet despite a higher likelihood of depression among women veterans outside of pregnancy, compared to the general population,[22] depression during pregnancy has not been well-studied. Pregnant veterans, especially those who have served in Operation Enduring Freedom, Operation Iraqi Freedom, and Operation New Dawn (OEF/OIF/OND), have higher rates of depression compared to OEF/OIF/OND women veterans who are not pregnant.[6] However, these rates are based on ICD-9CM or CPT diagnosis codes rather than well-validated self-report measures and thus likely underestimate the true prevalence of depression during pregnancy in veterans.[6]

Women veterans, compared to women in the general population, are uniquely challenged by combat-related exposures, military sexual trauma, and post-deployment stressors in addition to higher rates of other psychiatric conditions, such as post-traumatic stress disorder.[24,34] These factors may increase the occurrence of existing or new onset depression during pregnancy.[24] Perinatal depression, depression that develops during

pregnancy or within the first postpartum year, is associated with poor obstetrical outcomes such as low birthweight and preterm birth, as well as long-term consequences on the mother-infant relationship, compromised care giving practices, reduced rates of breastfeeding, increased sleep problems, and suicidal ideation.[15,16,33] Suicide is the most common cause of maternal morbidity in depressed women and exceeds both postpartum hemorrhage and hypertensive crisis as a cause of maternal mortality in general.[33,35] Despite this, it is woefully underdiagnosed and even when recognized, undertreated.[36] Taken together, this indicates great need for both comprehensive mental health and prenatal care for pregnant veterans.

Pregnant veterans receive nearly all maternity care from obstetrical providers outside of the VHA system, paid for under the auspices of the VA Community Care program.[3] However, a substantial proportion of veterans continue to receive mental health care within the VHA during their pregnancies.[6] Previous work has shown that veterans utilizing their VA prenatal benefits have higher rates of depression compared to pregnant women veterans who are eligible for these benefits but opt to use other insurance methods during pregnancy.[37] Depression screening by VA providers has been recommended for all pregnant veterans,[4] however, to date, little research has been conducted to quantify depressive symptomatology among pregnant veterans or to determine associations between depression symptoms and patient characteristics.

The goal of this analysis was to examine the prevalence and correlates of depression symptoms during pregnancy, including sociodemographic, health-related, and

military-related characteristics among a sample of pregnant veterans receiving healthcare within the VHA system.

METHODS

Study Design, Data Source, and Study Sample

Data were obtained from a larger cohort study, the Center for Maternal & Infant Outcomes & Research in Translation (COMFORT). Pregnant veterans were recruited from 15 VHA sites across the US. Eligible participants were 1) currently pregnant; 2) a veteran (not in active duty); 3) receiving maternity care through VHA benefits or another insurance plan (e.g., private insurance, Medicaid); and 4) English speaking. No participants were under the age of 18 because this is the youngest age of enlistment; there were no additional exclusion criteria.

Veterans were identified as being pregnant at one of the study sites by local study coordinators during pregnancy consults; this data was recorded by the veteran's VHA provider. All veterans confirmed to be pregnant were invited to participate in COMFORT via mailed recruitment packets that included an invitation letter to call to opt-in to the study. These invitation letters described the study and invited the veteran to call a toll-free number to receive further information. Research team members followed up with telephone calls to potential participants who did not respond to the study invitation. If eligibility criteria were met, two telephone surveys were scheduled with the woman veteran: one during the second or third trimester (ideally around 20-24 weeks of gestation) and a second within three months after delivery. Participants were reimbursed

$50 for each survey. This paper utilizes data collected during the first survey (*i.e.*, during pregnancy). Enrollment rates were roughly 40%; of the 1,410 eligible women who were sent invitation letters, 562 had agreed to participate at the time of this analysis.

As part of the telephone survey, information was collected about sociodemographic characteristics, military service, health status, healthcare utilization, social support, and pregnancy related factors. The 10-item Edinburgh Postnatal Depression Scale (EPDS) was also administered.[30] Study data were collected and managed using REDCap (Research Electronic Data Capture), a secure, web-based application designed to support data capture for research studies.[31] COMFORT was approved by the Veterans Administration Central Institutional Review Board (CIRB) and was given a waiver of written consent by the CIRB so that signed consent forms were not required from participants.

Additionally, electronic health record (EHR) data on service-connected disability status, date of birth, and past medical diagnoses was obtained on our participants from Veterans Affairs (VA) administrative data. Service-connected disability status is determined by the Veteran Benefits Administration and measured as a percentage from 0% to 100%, where 0% is the lowest level of disability and is different from not having a disability.[1]

Our sample included participants enrolled within the first two years of the study (January 28, 2016 – February 6, 2018) and until the enrollment goal of 500 participants was met. This paper analyzes data from 501 participants.

Definition of Outcome

We dichotomized our sample by EPDS score as <10 and ≥10, where higher scores indicate clinically significant depressive symptoms.[38] The EPDS has been validated as a screening tool for use in a pregnant population with a cut-off score of ≥10 determined to be an optimal cut-off point for detecting depression symptoms during pregnancy, with sensitivity, specificity, and positive predictive values of 70%, 96%, and 39%, respectively, at 24 weeks of pregnancy.[38] The American College of Obstetricians and Gynecologists (ACOG) recommends the use of the EPDS during pregnancy for its ease in administration, its ability to capture anxiety symptoms, and its exclusion of symptoms of depression that are also frequent during pregnancy (such as sleep-related changes).[33]

EPDS scores were totaled during the interview. For EPDS scores ≥10 and/or if the veteran answered "yes" to the self-harm question (EPDS Item 10), a suicide crisis protocol was developed in consultation with the VA Office of Suicide Prevention. In brief, the interviewer provided the veteran with a warm transfer to the VA Crisis Line and additionally asked if they would like help in getting connected to mental health resources at their local VA site. If yes, an email requesting help and follow-up was sent to the Local Site Investigator (LSI), who then took over contact with the veteran and helped set up additional mental health care as needed. As this discussion between the interviewer and veteran remained confidential, no data were available regarding completed crisis hotline calls or local site follow-up with these participants.

Demographic, Military, Health-Related, and Pregnancy Factors

We selected potential correlates of depression symptoms based on previous literature on predictors of depression symptoms during pregnancy,[17] suggested military-related correlates,[24] and available data collected in the COMFORT survey. Data used in this analysis included self-reported sociodemographic characteristics (age, marital status, race, ethnicity, sexual orientation, employment status, urban/rural status, number of adopted/biological children living at home, health insurance); military service (years of service, deployment status, OEF/OIF/OND status, branch, component, service-connected disability status, history of military sexual trauma (MST)); medical history (past mental health diagnoses, receipt of an anti-depressant prescription prior to the current pregnancy, report of currently having a VA primary care provider); and pregnancy related factors (past pregnancy outcomes, contraceptive use at time of conception, fertility treatment utilization, prenatal care history, social support during pregnancy, receipt of VA maternity care coordination services). The military sexual trauma (MST) questions were adapted from the VHA's universal MST screening questions, which have been described previously.[39] OEF/OIF/OND status included any veteran who served in any of those specific military tours. Urban/rural status referred to the geographic region associated with each participants zip code and the FY15 VA Planning Systems Support Group (PSSG) file, which assigns each veteran a "U" (urban), "R" (rural), or "HR" (highly rural) value based on their home residence. For zip codes appearing with more than one URH code in the PSSG file, the code with the highest frequency of veterans for the zip code-URH pair was selected.

Several variables from the EHR data were used in place of survey variables due to the expected reliability of the EHR data over the survey data. Age was calculated from birth date, which was not collected during the survey but is included in the EHR data, and interview date obtained from the survey data. OEF/OIF/OND service and service-connected status were obtained from the EHR. As in previous analyses,[40] we dichotomized presence of service-connected disability as yes (>0%) or no.

Analytic Approach

We first examined bivariate relationships between sociodemographic characteristics, military service, health status, and pregnancy related variables with EPDS score group. Student's *t*-tests and chi-squared tests were used to examine differences between EPDS groups and continuous factors and categorical factors, respectively.

Next we computed multivariable logistic regression models to examine the likelihood of higher EPDS scores, retaining variables from bivariate analyses that were statistically significant at the α=0.05 level. We collapsed several multi-category variables for the models, including marital status (married vs. not), race (white vs. non-white), component (active vs. National Guard/Reserves/civilian), and military sexual trauma (yes vs. no). Combining categories did not change the statistical significance in bivariate analyses; we combined all categories of non-white race because cell counts were low among individuals who identified as a race other than white.

Our final model consisted of the variables from our initial multivariable model that further met model inclusion criteria. We used a backward selection process to

remove variables, starting with the least significant, refitting subsequent models until all predictors were significant. Adjusted odds ratios (aOR) and 95% confidence intervals (CI) for each included factor are reported. Model fit was assessed with Hosmer-Lemeshow tests. We evaluated multicollinearity prior to running our models using a correlation matrix of all potential included factors and condition indices. Although multicollinearity was not found, to identify potential overlap in the included correlates we ran several sensitivity analyses with models including ever diagnosis of depression and receipt of past antidepressant prescriptions as a combined variable and combining history of mental health disorders in different ways, including depression history in this variable, excluding depression history from this variable but retaining it as a separate variable in the model, and excluding depression history completely from the model.

To examine the potential of site clustering, we conducted a generalized linear mixed model in the form of a hierarchical logistic regression model (using the GLIMMIX procedure in SAS), using the variables from our final logistic model, to account for the clustering of patients within each of the 15 study sites, where each study site is treated as a random variable.[41]

We assumed that missing data were missing completely at random (MCAR) or missing at random (MAR) and not missing based on presence of depression symptoms. However, to examine the potential effect of missing data in our sample, we ran a sensitivity analysis using multiple imputation methods with PROC MI to impute values for variables used in our final regression models ($p<0.05$ in bivariate analyses).

All analyses were conducted in SAS version 9.2 (SAS Institute, Inc., Cary, North Carolina).

FINDINGS

Our sample of pregnant veterans included 501 women with complete prenatal interviews; 142 (28%) with an EPDS score ≥10 suggestive of clinically significant depressive symptoms and 359 (72%) with an EPDS score <10. Those showing depressive symptomology had mean EPDS scores of 14.7 (+/- 4.0) with a range from 10 to 26 (data not shown). Participants were on average 23 weeks gestation and 31 years of age at the time of the survey. Over half of participants were white, married, and currently employed; however, more women with an EPDS <10 were married compared to those with an EPDS ≥10 (70% vs. 51%, p=0.02). Women with EPDS <10 were more likely to be employed compared to women with an EPDS ≥10 (p<0.0001) (Table 2.1).

On average, participants served six years in the military. Over 90% were OEF/OIF/OND veterans, correlating with the ages of participants. About half of women in both EPDS groups served in the Army compared to any other branch in the military. Some military characteristics differed slightly by EPDS group. Women with an EPDS ≥10 were less likely to have been deployed in the past (p=0.06) but more likely to have been in active duty as their most recent component in the military compared to women with EPDS <10 (p=0.0061). Women with an EPDS ≥10 were more likely to have a service-connected disability rating (p=0.0009) and more likely to report experiencing

military sexual trauma or receiving counseling for military sexual trauma ($p<0.0001$) (Table 2.1).

Mental health status differed significantly between EPDS groups. Women with an EPDS score ≥10 were significantly more likely to report ever being prescribed anti-depressants (82% vs. 47%, $p<0.0001$) and to report ever being diagnosed with a past mental health condition (91% vs. 63%, $p<0.0001$) (Table 2.1). Over half of women with an EPDS ≥10 reported plans to continue seeing a mental health provider during their pregnancy, with over 90% of these women reporting planning to see a VA specific mental health provider. Close to a quarter of women in the EPDS <10 group also reported plans to continue seeing a mental health provider during pregnancy. Women with an EPDS score ≥10 scored significantly worse on all question compared to women with an EPDS <10 (data not shown).

Obstetrical history was similar between EPDS groups; most women had been previously pregnant (64%) and had received their first prenatal appointment for the current pregnancy between 9-12 weeks of pregnancy (45%). The vast majority of pregnant veterans had received some VA maternity care coordination services (77%). Nearly all participants reported receiving some form of social support during pregnancy; however, more women in the EPDS <10 group indicated partner specific support compared to those in the EPDS ≥10 group (95% vs. 82%, $p<0.0001$) (Table 2.1).

Our primary multivariable model included marital status, race, employment status, military component, service-connected disability status, report of military sexual trauma, social support from a partner during pregnancy, self-reported ever treated for

drug abuse or alcoholism, self-reported past antidepressant prescription, and ever diagnosis of the following mental health conditions: depression, PTSD, anxiety, mood disorder, or bipolar disorder. The backward selection process removed bipolar disorder, marital status, PTSD, military sexual trauma, mood disorder, race, drug abuse or alcoholism, depression, and service-connected disability status, respectively. Hosmer-Lemeshow tests for our final model indicated good model fit (p=0.8338). A review of condition indices did not indicate collinearity in our final model. The final model included 413 (82%) participants with full (non-missing) data. Missing correlates were imputed in sensitivity analyses, and results were generally consistent (data not shown).

Our final model indicated that among pregnant veterans, having support from a spouse or partner resulted in a 65% decreased odds of an EPDS ≥10 compared to veterans reporting no spousal or partner support. Employment was also protective, with veterans reporting employment at the time of the prenatal interview having a reduction in odds of an EPDS ≥10 of 60% compared to those reporting being unemployed or a homemaker or student. A past diagnosis of anxiety resulted in a 2.5 times increased odds of an EPDS ≥10 (95% CI: 1.43-4.50). Similarly, receipt of a past antidepressant prescription (prior to the most recent pregnancy) was associated with higher EPDS symptomology compared to never receiving a past anti-depressant prescription (aOR: 3.27; 95% CI: 1.71-6.24). Pregnant veterans most recently serving in active duty were nearly twice as likely to score an EPDS ≥10 compared to National Guard, Reserves, or civilian government employee veterans (aOR: 1.91; 95% CI: 1.08-3.37) (Table 2.2). Accounting for clustering by site yielded consistent findings (data not shown).

DISCUSSION

To the best of our knowledge, this study is the first to quantify depression symptoms and identify correlates during pregnancy within a sample of veterans. In our sample of pregnant veterans, 28% scored a 10 or higher on the EPDS, suggesting presence of depression symptoms. This is the first quantitative estimate of depression symptoms in pregnant veterans, and it is greater than the high end of the 20-25% prevalence estimates of depression in the general pregnant population.[8,10] Given that the onset of over half of perinatal depression cases occur prior to the postpartum period,[11] women who can be identified as depressed or at-risk for depression during pregnancy can be offered critical resources and support prior to birth.[11,42]

Our findings are similar to previous work which has found depression prevalence estimates of 25% in women veterans ages 18-44,[1] although over half of all of our study participants reported ever being diagnosed with depression. Among those with EPDS scores ≥10, past diagnoses of mental health conditions were high, with over 90% reporting being diagnosed with a mental health condition. This is in line with previous findings on the relationship between pre-pregnancy mental health diagnoses and higher EPDS scores among pregnant veterans.[43] A recent review of perinatal depression among military women (*i.e.,* active-duty servicewomen or spouses of active-duty servicemen) found that prevalence of depression symptoms during pregnancy and postpartum ranged from 4.6 to 50.7% overall and 11.3 to 24% among active-duty servicewomen, suggesting

that our estimates are consistent with studies in similar populations, although ours focused on specifically the pregnancy period.[44]

Accordant with hypotheses of potential factors unique to pregnant veterans that may increase symptoms of depression, we found that previous active-duty status increased the odds of depression symptoms, after adjustment for key sociodemographic factors.[24] Additionally, we found a relationship between military sexual trauma and prenatal depression symptoms. MST has been shown to be associated with increased odds of PTSD, anxiety, depression, and substance use disorders.[45] Previous work has also shown a connection between employment and depression in women veterans, where higher levels of social and financial support have been associated with lower levels of depression in female veterans after deployment[46] and unemployed female veterans screen positive for depression more often than employed female veterans.[47] More non-white women in our sample scored an EPDS ≥10 compared to white women in bivariate analyses. This is in contrast to previous work that did not find differences between racial and ethnic groups and prevalence of depression in non-pregnant veteran samples.[48–50]

Most of the women in our sample with an EPDS ≥10 and many of those in the EPDS<10 group reported plans to visit a mental health provider during their pregnancy; for nearly all of these women, this mental health care would be obtained within the VHA. This suggests that many pregnant veterans plan to remain engaged within the VHA system while also receiving prenatal care from a community provider. This receipt of care from both VHA mental health providers and non-VHA obstetricians can create a fragmented system that may be difficult for pregnant veterans to navigate. It is unclear if

any collaboration between VHA mental health and community obstetric providers occurs and whether information about mental health status is clearly transmitted to obstetricians who may need to make specific care decisions for women with depression during pregnancy. Maternity care coordination has been mandated by the VHA (see VHA Handbook 1330.03[4]) as a tool to help pregnant veterans manage their care via maternity care coordinators who have the ability to link veterans to needed treatment.[1,51] However, it is still unknown how women veterans manage depression symptoms during pregnancy and what treatment strategies they utilize. Future research focusing on depression treatment utilization during pregnancy will help clarify how well care is being coordinated between providers and if veterans are receiving the treatment they need during pregnancy. Pregnancy may be an ideal time to focus on treatment strategies, prior to the birth of the baby.

We note several limitations with our study. Because we utilized an opt-in strategy, our overall enrollment rate was relatively low considering the number of invitation letters sent, and thus we may be underestimating the number of depressed pregnant veterans because those experiencing more depression symptoms may have been less likely to participate. However, our response rate is similar to a previous telephone survey conducted in a sample of women veterans ages 18-44, and in comparison to this nationally representative sample, our sample was similar with respect to age distribution, race, past mental health diagnoses, and military sexual trauma experience.[52] Phone interviews may be more likely to encourage responder bias, where the participant may feel like they need to answer a specific way or rate themselves more favorably (*i.e.*, less

symptomatic) on the EPDS. We were also unable to control for the timing of past mental health diagnoses or diagnoses recorded outside of VHA care. It is possible that the timing of the first diagnosis may play a role in determining depression symptoms in this population, and whether primary depression diagnoses occurring after military service ends (i.e., recorded in the VHA database) are more or less likely to predict symptoms of depression during pregnancy compared to diagnoses occurring before military enrollment. Next, our findings are likely not generalizable to a broader population outside of English-speaking pregnant veterans receiving their care within the VA medical system. Finally, EPDS cannot be used as a diagnosis tool, only as a means of identifying depression symptomology.

Our study also has a number of strengths, including a large sample size. Our study sample was diverse and was comprised of veterans from VA sites across the country. We were able to collect information on a wide-range of sociodemographic, military, pregnancy-related, and health-related factors in our telephone survey, which may not have been possible via other means of data collection. Likewise, responses to the EPDS were complete and available for 100% of our participants.

CONCLUSIONS

Our work is the first to quantify the rate of depression symptoms among a sample of pregnant veterans using a validated self-report depression screener. The prevalence of depression symptomology was greater than the high end of prevalence estimates in the general pregnant population. Given that the risk of depression increases during the

postpartum period, women who can be identified with depressive symptomatology during pregnancy can be offered critical resources and support prior to birth.

IMPLICATIONS FOR PRACTICE AND/OR POLICY

This work is crucial given the rapid growth in the population of young women veterans and the need for quality prenatal and mental health care during pregnancy. Our study provides data that highlights the need for depression screening among pregnant veterans and identifies several key risk factors. Subsequent research should focus on treatment utilization patterns among pregnant veterans to understand types and prevalence of treatment strategies used during pregnancy.

Table 2.1: Participant Characteristics (N=501)

Characteristic	EPDS<10 N=359	EPDS>=10 N=142	P-value
Demographics			
Estimated Age (Mean ± SD, Range)	31.9 ± 4.4 (20.4-48.7)	31.4 ± 4.5 (22.6-41.7)	0.24
Marital Status (N, %)			
Single	57 (15.9)	32 (22.5)	
Married	251 (69.9)	72 (50.7)	
Divorced	22 (6.1)	11 (7.7)	0.02
Separated	4 (1.1)	5 (3.5)	
Widowed	1 (0.3)	0 (0.0)	
Missing/Unknown	24 (6.7)	22 (15.5)	
Race: White (N, %)	236 (65.7)	74 (52.1)	0.0047
Race: Black (N, %)	71 (19.8)	45 (31.7)	0.0044
Race: Other (N, %)	57 (15.9)	26 (18.3)	0.51
Hispanic or Latino/Latina (N, %)	63 (17.5)	22 (15.5)	0.56
Sexual Orientation (N, %)			
Heterosexual	341 (95.0)	133 (93.7)	0.32
Lesbian/gay/bisexual/asexual	11 (3.1)	7 (4.9)	
Missing/Unknown	7 (1.9)	2 (1.4)	
Urban/Rural Status (N, %)			
Urban	264 (73.5)	103 (72.5)	0.87
Rural	94 (26.2)	38 (26.8)	
Missing	1 (0.3)	1 (0.7)	
Current Employment Status (N, %)			
Employed	208 (57.9)	51 (35.9)	<.0001
Unemployed/Homemaker/Student/Other	150 (41.8)	91 (64.1)	
Missing/Unknown	1 (0.3)	0 (0.0)	
Number of Adopted or Biological Children Currently Living with You (N, %)			0.51
0	145 (40.4)	54 (38.0)	

1	129 (35.9)	46 (32.4)	
2-3	73 (20.3)	33 (23.2)	
4+	10 (2.8)	7 (4.9)	
Missing/Unknown	2 (0.6)	2 (1.4)	
Private Health Insurance (N, %)	112 (31.2)	33 (23.2)	0.07
Government Health Insurance (Medicare, Medicaid, CHAMPUS, TRI-CARE or other insurance for military personnel) (N, %)	98 (27.3)	49 (34.5)	0.10
Plan to Use VA Maternity Care Benefits and/or Private Insurance for Pregnancy Coverage (N, %)			
VA maternity care benefits only	279 (77.7)	111 (78.2)	0.66
Private insurance only	8 (2.2)	5 (3.5)	
Both VA maternity care benefits & private insurance	67 (18.7)	24 (16.9)	
Missing/Unknown	2 (0.6)	2 (1.4)	
Other	3 (0.8)	0 (0.0)	
Military Characteristics			
Years of Service (Mean ± SD, Range)	6.3 ± 3.5 (1.0-19.0)	5.8 ± 3.4 (1.0-22.0)	0.22
Deployed (N, %)	235 (65.5)	82 (57.7)	0.06
OEF/OIF/OND (N, %)	332 (92.5)	132 (93.0)	0.25
Military Branch (N, %)			
Airforce	69 (19.2)	25 (17.6)	0.78
Army	176 (49.0)	75 (52.8)	
Marine Corps	34 (9.5)	17 (12.0)	
Navy	75 (20.9)	24 (16.9)	
Coast guard	4 (1.1)	1 (0.7)	
Civilian employee	1 (0.3)	0 (0.0)	
Component (N, %)			
Active duty	225 (62.7)	108 (76.1)	0.0061
National Guard	61 (17.0)	16 (11.3)	
Reserves	71 (19.8)	15 (10.6)	
Civilian government employee	2 (0.6)	3 (2.1)	

Service-Connected Disability Status* (N, %)	268 (74.7)	122 (85.9)	0.0009
Medical and Mental Health History			
Ever received medical treatment for drug abuse or alcoholism (N, %)	21 (5.8)	21 (14.8)	0.0011
Mental Health Diagnoses (Ever Diagnosed)			
Depression (N, %)	170 (47.4)	116 (81.7)	<.0001
Bipolar Disorder (N, %)	16 (4.5)	16 (11.3)	0.0050
Other Mood Disorder (N, %)	31 (8.6)	35 (24.6)	<.0001
Anxiety Disorder (N, %)	136 (37.9)	96 (67.6)	<.0001
PTSD (N, %)	118 (32.9)	88 (62.0)	<.0001
Schizophrenia (N, %)	0 (0.0)	1 (0.7)	0.28
ADHD or ADD (N, %)	23 (6.4)	13 (9.2)	0.28
Eating Disorder (N, %)	12 (3.3)	10 (7.0)	0.07
Ever Diagnosis of Any Mental Health Condition** (N, %)	220 (61.3)	130 (91.5)	<.0001
Ever Prescribed Anti-Depressants before Recent Pregnancy (N, %)	168 (46.8)	117 (82.4)	<.0001
Plan to Continue to see Mental Health Provider During Pregnancy (N, %)[†]			<.0001
Yes, VA Mental Health provider	72 (20.1)	68 (47.9)	
Yes, non-VA Mental Health provider	9 (2.5)	7 (4.9)	
Currently Have a VA Women's Health Provider or VA Primary Care Physician (N, %)	322 (89.7)	123 (86.6)	0.33
Military Sexual Trauma: Received uninvited and unwanted sexual attention while in the military (N, %)	163 (45.4)	98 (69.0)	<.0001
Military Sexual Trauma: Force or the threat of force was used to have unwanted sexual contact while in the military (N, %)	82 (22.8)	68 (47.9)	<.0001
Ever Counseling/Treatment for Military Sexual Trauma from VA or non-VA provider (N, %)	67 (18.7)	55 (38.7)	<.0001
Pregnancy Characteristics			
Weeks Gestation @ Prenatal Interview (Mean ± SD, Range)	23.1 ± 5.2 (10.4-40.0)	23.0 ± 5.3 (4.4-39.1)	0.87
First Pregnancy (N, %)	137 (38.2)	42 (29.6)	0.07

Previous Live Birth (N, %)	209 (58.2)	92 (64.8)	0.18
Previous Miscarriage (N, %)	76 (21.2)	38 (26.8)	0.18
Previous Abortion (N, %)	15 (4.2)	11 (7.7)	0.10
Previous Stillbirth (N, %)	8 (2.2)	2 (1.4)	0.73
Using Contraception at time of Pregnancy (N, %)	36 (10.0)	20 (14.1)	0.19
Used Fertility Medications or Medical Procedures to get Pregnant (N, %)	34 (9.5)	10 (7.0)	0.39
Weeks pregnant when 1st saw prenatal care provider (N, %)			
8 weeks or less	145 (40.4)	55 (38.7)	0.81
9-12 weeks	161 (44.8)	63 (44.4)	
13 or more weeks	51 (14.2)	24 (16.9)	
Did not receive prenatal care	1 (0.3)	0 (0.0)	
Missing/Unknown	1 (0.3)	0 (0.0)	
Received prenatal care as early as wanted (N, %)	254 (70.8)	93 (65.5)	0.24
Any Social Support during Pregnancy (N, %)	359 (100.0)	140 (98.6)	0.08
Seek social support from family member (spouse, partner) (N, %)	340 (94.7)	116 (81.7)	<.0001
Received any VA Maternity Care Coordination Services (N, %)	279 (77.7)	107 (75.4)	0.43

Note: p-values from χ^2 tests for categorical variables; for variables with cell sizes <5 Fisher's Exact p-values are reported. P-values for continuous variables from Student's t-test (with Satterthwaite adjustment when appropriate).

** Service-connected disability status is determined by the Veteran Benefits Administration and measured as a percentage from 0% to 100%, where 0% is the lowest level of disability and is different from not having a disability.*

***Any mental health condition variable includes self-reported ever diagnosis of any of the following: depression, anxiety, PTSD, mood disorder, ADHD/ADD, bipolar disorder, schizophrenia, eating disorder.*

†*This question was only relevant to participants responding that they had a mental health provider before pregnancy and therefore was not included in multivariable models.*

Table 2.2: Results from Multivariable Model* Predicting EPDS ≥10 among Pregnant Veterans in the COMFORT Study (n=501)

	Full Logistic Model			Logistic Model with Backward Selection		
	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI
Marital Status (Married vs. Not Married)	0.91	0.52	1.61			
Race (White vs. Non-White)	0.74	0.44	1.25			
Employed vs. Unemployed/Homemaker/Student/Other	0.42	0.25	0.71	0.40	0.24	0.67
Active Duty vs. National Guard/Reserves/Civilian	1.71	0.95	3.07	1.91	1.08	3.37
Service-Connected Disability (Yes vs. No)	1.92	0.78	4.72			
Ever Treatment for Drug Abuse or Alcoholism (Yes vs. No)	1.56	0.68	3.59			
Ever Depression Diagnosis (Yes vs. No)	1.41	0.68	2.93			
Ever Bipolar Disorder Diagnosis (Yes vs. No)	0.90	0.35	2.30			
Ever Mood Disorder Diagnosis (Yes vs. No)	1.19	0.58	2.43			
Ever Anxiety Diagnosis (Yes vs. No)	2.14	1.16	3.93	2.54	1.43	4.50
Ever PTSD Diagnosis (Yes vs. No)	1.10	0.62	1.97			
Ever Antidepressant Prescription Prior to Pregnancy (Yes vs. No)	2.33	1.09	5.00	3.27	1.71	6.24
Any Military Sexual Trauma** (Yes vs. No)	1.11	0.64	1.94			
Social Support from Spouse/Partner during Pregnancy (Yes vs. No)	0.41	0.18	0.98	0.35	0.16	0.77

**Hosmer-Lemeshow Goodness of Fit for full logistic model: p=0.8028; for backward selection model: p=0.8338.*

***Any military sexual trauma included an affirmative response to any of the following: received uninvited and unwanted sexual attention while in the military, force or the threat of force was used to have unwanted sexual contact while in the military, ever counseling/treatment for military sexual trauma from VA or non-VA provider.*

CHAPTER III: TREATMENT AND MANAGEMENT OF DEPRESSION SYMPTOMS IN PREGNANT VETERANS: VARYING EXPERIENCES OF MENTAL HEALTH CARE IN THE PRENATAL PERIOD

ABSTRACT

BACKGROUND: Depression screening is recommended for all pregnant veterans; however, little is known on how often symptomatic women receive care, how depression treatment presents in practice, and whether women veterans are utilizing treatment during the perinatal period.

METHODS: Our sample included 142 pregnant veterans from 15 Veterans Health Administration (VHA) medical facilities with Edinburgh Postnatal Depression Scale (EPDS) scores ≥10. Sociodemographic characteristics, military service, health utilization, pregnancy related factors, and qualitative responses to questions regarding mental health care during pregnancy were collected as part of a telephone survey.

FINDINGS: A majority of our sample (70%) had 1 or more mental health visits or antidepressant prescriptions during pregnancy. Women with a history of depression had more mental health visits and a higher percentage of antidepressant use before and during pregnancy than women without a history of depression. We identified themes from qualitative interviews describing mental health medication risk discussions and use and discontinuation of mental health medications during pregnancy.

CONCLUSIONS: Pregnant women veterans without a history of depression may be less likely to receive care for depression during pregnancy. However, the majority of our veterans showing depression symptoms prenatally had at least one mental health visit or an antidepressant medication fill during their pregnancy window, suggesting that mental health care is readily available for women veterans. Women veterans described varying experiences with medication risk discussions with providers during pregnancy, indicating a need for enhanced standard practice guidelines.

BACKGROUND

Depression is common during the prenatal period among women veterans.[6] Women veterans are more likely to experience combat-related trauma and post-deployment stressors, and in general have higher rates of depression, compared to the general population.[24] A recent prospective study identified depression symptoms in nearly 30% of pregnant veterans.[53] Despite high rates of depression, there is little understanding of how pregnant veterans manage their mental healthcare during pregnancy, especially important because the perinatal time marks a distinct period when women encounter their providers on a regular basis, offering unique opportunities for screening and treatment for depression.[54]

Because women remain a numerical minority in the Veterans Health Administration (VHA), VHA medical facilities do not provide onsite maternity care. Rather, maternity care for veterans is provided by non-VHA obstetricians and reimbursed by the VHA. The Department of Veterans Affairs (VA) recommends depression screening for all pregnant veterans,[4] however, there is a paucity of research regarding the frequency or quality of depression treatment during pregnancy. Previous studies suggest that while receiving prenatal care from non-VHA providers, a substantial proportion of veterans concurrently receive mental health care within the VHA.[6,55] Coordination of care between non-VHA and VHA providers is an important aspect of maternity care for veterans. VA guidelines state that information sharing, “particularly in the area of medication management and monitoring for medications that have teratogenic effects,” is “critical to patient safety.”[4] Coordination of medication risk discussions between the

patient, her mental health provider, and her obstetrician has previously been shown to contribute to greater depression treatment during the perinatal period.[36,56,57]

Psychotherapy has been shown to be an effective treatment strategy for pregnant women with depression.[58,59] However, therapy brings its own challenges, among them patient barriers such as cost, travel difficulties, and time constraints,[59] as well as systematic barriers such as lack of provider training, limited access to providers, and absence of standardized screening and referral processes.[56]

To date, few studies have examined pregnant veterans' use of antidepressants. The prevalence rate of antidepressant use during pregnancy has been estimated to be near 5% in the general population,[60,61] with some point estimates placing antidepressant use at any time during pregnancy close to 13%.[62] Little is known about the rates of antidepressant use among pregnant veterans; however, a previous study reported nearly 90% of the sample of female veterans of childbearing age had used any prescription medication within the past year.[63] Antidepressant use during pregnancy is not without risk, with associations between antidepressant use and miscarriage, low birthweight, preterm birth, and the risk for complications in newborns such as irritability, tachypnea, hypoglycemia, and temperature instability in the days following birth.[59,64] However, the risks of untreated maternal depression include behavior problems and cognitive delays in infants, compromised care giving practices, reduced rates of breastfeeding, maternal sleep problems, and greater suicidal ideation compared to women without depressive symptoms.[15,16] Both the VA and the American College of Obstetricians and Gynecologists (ACOG) recommend risk/benefit discussions between a patient and her

provider regarding continuing or starting an antidepressant medication during pregnancy[64–66]; however, rates as low as 24% have been reported for discussions between reproductive age female veterans and their providers about medication risks.[63] These challenges of available treatment options and the overall low adherence rate to treatment among depressed pregnant and postpartum women have yet to be studied among veterans[36].

Using a mixed-methods approach, our objective was to evaluate the rate of mental health care treatment utilization during pregnancy and to understand the experience and management of depression in a sample of pregnant veterans. We identify differences in treatment utilization during pregnancy among women who report past diagnoses of depression compared to those with no past diagnosis. Additionally, we explore the decisions women make regarding antidepressant medication use during pregnancy and the extent to which pregnant veterans discuss medication risk counseling with their VHA and/or obstetrical providers.

METHODS

Study Design, Data Source, and Study Sample

Participants were identified at 15 VHA sites across the US as part of the Center for Maternal and Infant Outcomes Research in Translation (COMFORT) study.[67] COMFORT was approved by the Veterans Administration Central Institutional Review Board (CIRB) and was given a waiver of consent by the CIRB so that signed consent forms were not required from participants. Pregnant veterans were identified by the

veteran's VHA provider. To utilize maternity care benefits, women veterans must have a visit with their VHA provider to confirm their pregnancies prior to obtaining maternity care from an accredited prenatal provider.[4] All veterans confirmed to be pregnant were mailed recruitment packets that invited the veteran to call a toll-free number to receive further information. Additionally, research team members followed up the mailings with telephone calls to potential participants. Two telephone surveys were scheduled with pregnant veterans who agreed to participate; the first during the second or third trimester (around 20-24 weeks of gestation) and a second within three months of delivery.

Participants were reimbursed $50 for each survey. Enrollment rates were roughly 40%; of the 1,410 eligible women who were sent invitation letters, 562 had agreed to participate at the time of this analysis. Quantitative study data were collected and managed using REDCap (Research Electronic Data Capture), a secure, web-based application designed to support data capture for research studies.[31] Additionally, electronic health record (EHR) data on date of birth, service-connected disability status, past medical diagnoses, and healthcare utilization during pregnancy were obtained on participants from VA Corporate Data Warehouse (CDW) administrative data. The CDW is a repository of data updated nightly from the VHA electronic medical records system for operations and research use.[32]

Our sample included 142 participants enrolled within the first two years of the study (January 28, 2016 – February 6, 2018) and scoring ≥10 on the Edinburgh Postnatal Depression Scale (EPDS) administered in the prenatal period; we were able to match 135 (95%) participants to their EHR within the VA CDW. Of those missing CDW data, the

majority (n=5, 71%) did not provide their social security number or only provided the last 4 digits, preventing identification in the CDW data. The remaining participants (n=2) could not be matched with a social security number in the CDW.

Definition of Quantitative Outcomes

Healthcare utilization was examined through mental health visits and antidepressant use, both as recorded in VHA EHR data and self-reported in the prenatal COMFORT survey. We examined healthcare utilization in two time-periods: pre-pregnancy and pregnancy. We defined pregnancy as 280 days prior to the newborn date of birth (available for 59% of our sample) or estimated delivery date (for the remaining 41% of our sample), as done in previous analyses.[40,68] Pre-pregnancy was considered prior to the start of the pregnancy time period, defined as 280 to 560 days prior to delivery or estimated due date (newborn date of birth-280 days)-280 days) (Figure 3.1). This gave us comparable time periods to examine healthcare utilization in our sample (i.e., 280 days prior to pregnancy and 280 days during pregnancy). To identify mental health care visits, we utilized VHA mental health stop codes, indicators in the EHR that flag the clinical group responsible for an outpatient encounter (Appendix 3.1).[69] We also obtained information on receipt of an antidepressant medication, where a 30-day fill prescribed at any point during our pre-pregnancy or pregnancy windows was considered receipt of a prescription antidepressant. We opted to include only antidepressant prescriptions because we specifically asked about antidepressant use in our survey and used the EPDS to determine depression symptomology. Our definition of antidepressants

included selective serotonin reuptake inhibitors (SSRI), serotonin–norepinephrine reuptake inhibitors (SNRI), tricyclic antidepressants (TCA), monoamine oxidase inhibitors (MAOI), noradrenergic and specific serotonergic antidepressants (NASSA), norepinephrine-dopamine reuptake inhibitors (NDRI), bupropion, selective serotonin reuptake enhancers (SSRE), tianeptine, norepinephrine-dopamine disinhibitors (NDDI), and agomelatine (Appendix 3.2). We created a variable, "Any VHA Mental Health Care during Pregnancy" defined as one or more mental health visits during pregnancy or any receipt of an antidepressant prescription.

Additionally, we examined self-reported mental health care utilization using responses from the prenatal survey. Participants were asked about antidepressant use with the following questions: "Before this recent pregnancy, had you ever been prescribed anti-depressants?" immediately followed by "Currently, are you taking any medications for mental health conditions?". To identify visits with a mental health provider, participants were asked: "At the time you found out you were pregnant were you seeing a mental health provider?" and "During this pregnancy will you continue to see a mental health provider?".

Demographic, Military, Health-Related, and Pregnancy Factors

We selected potential correlates of depression care utilization during pregnancy based on previous literature, including history of depression,[70] as well as data available from the COMFORT telephone survey. The telephone survey collected information including sociodemographics, military service, health status, healthcare utilization, social

support, and pregnancy related factors. Participants were asked if they had ever been diagnosed with depression. A 10-item Edinburgh Postnatal Depression Scale (EPDS) was also administered,[30] with a cutoff of 10 used to define present depression symptoms[38] and a cutoff of 13 used to suggest probable major depression.[71] Multiple times during the interview, participants were reminded that they could refuse further participation in the study or refuse to answer specific questions. Participants with affirmative responses to the self-harm question of the EPDS were directed to further clinical follow-up.

Data used in this analysis included demographics (race/ethnicity, marital status, and employment status), military characteristics (deployment history and history of military sexual trauma (MST), adapted from the VHA's universal MST screening questions and described in previous literature[39]), as well as self-reported past mental health diagnoses from the COMFORT survey. From the EHR, past depression diagnoses were identified as ever being present by the following ICD-9 and ICD-10 diagnosis codes: ICD-9: 293.83, 296.2, 296.3, 296.90, 298.0, 300.4, 309.0, 309.1, 311; ICD-10: F32, F33, F34, F39. To examine the reliability and validity of self-reported depression diagnoses in this sample of veterans, we performed a reliability analysis using Cronbach's α and calculated sensitivity, specificity, and positive predictive values to compare to EHR variables for the same diagnoses. We found sensitivity, specificity, and positive predictive values rates of 0.90, 0.42, and 0.77, respectively, with most discordant cases for women self-reporting the condition when it was absent in the EHR (data not shown). Age, OEF/OIF status, and service-connected status were also obtained from EHR data. OEF/OIF status included any veteran who served in any of those specific

military tours; service-connected disability status was determined by the Veteran Benefits Administration and measured as a percentage from 0% to 100%, where 0% is the lowest level of disability and is different from not having a disability[1]; here dichotomized as presence of service-connected disability percentage of yes (>0%) or no as in previous analyses.[40]

Qualitative Methods

Prior to the start of recruitment, we developed a semi-structured interview guide with questions related to the experiences of veterans regarding depression management and other mental health care during pregnancy (Appendix 3.3). All enrolled veterans participated in the semi-structured interview. We selected a purposive sample of 42 interviews from participants with a prenatal EPDS≥10 in which medication management or mental health care were discussed specifically; these interviews were selected from all interviews with pregnant veterans showing depressive symptoms. In this mixed methods analysis, our quantitative aims informed our qualitative approach through an explanatory sequential mixed methods design.[72] Our quantitative analyses were prioritized, with quantitative data analysis occurring first to inform our qualitative data collection and analysis. By doing so, we were able to link our quantitative and qualitative data through our sampling frame.[72]

The open-ended responses of the interview were digitally recorded to capture verbatim content and were professionally transcribed for this analysis. Interview notes and recordings were linked by an unidentifiable participant code.

ANALYSIS

Quantitative Analysis

Descriptive statistics, including means, standard deviations, and ranges for continuous variables, and frequencies for categorical variables, were calculated and presented.

To examine correlates of any VHA mental health care during pregnancy, we conducted bivariate analyses of variables of interest by our derived mental health care variable of one or more mental health visits during pregnancy or any receipt of an antidepressant prescription. Chi-squared tests and relative risks with 95% confidence intervals were calculated.

As we additionally sought to learn more about how women veterans treated and managed their depression symptoms during pregnancy, we then compared demographic, military, and mental health characteristics by women who reported having been diagnosed with depression prior to pregnancy versus those who reported no past diagnosis. We used chi-squared tests to examine differences in categorical factors and Student's t-test to examine mean differences in continuous factors.

We also ran sensitivity analyses to test the reliability of our 280-day pregnancy window. We calculated estimated gestational age at delivery in our sample, using the difference between the date of the prenatal COMFORT interview and self-reported gestational age at that interview to set a "time zero". We then calculated the difference between "time zero" and delivery date or estimated due date. Our average estimated

gestational age at delivery was 275.25 days (+/- standard deviation of 10.44) with a median and mode of 280 days. Our shortest estimated gestational period was 203 days; our longest estimated gestational period was 296 days. Given our minimum and maximum estimated gestational window of 203 days and 296 days, respectively, we reran our calculations of mental health visits and antidepressant prescriptions for pre-pregnancy and pregnancy windows of 200 and 300 days, respectively (Appendices D & E).

All quantitative analyses were conducted in SAS version 9.2 (SAS Institute, Inc., Cary, North Carolina).

Qualitative Analysis

We utilized a phenomenological approach to understand how pregnant veterans managed their depression symptoms and mental health care during pregnancy. Phenomenological approaches are used to understand situational experiences viewed through the personal perceptions of participants,[73,74] requiring the researchers to consider the analysis without preconceived ideas or beliefs about the experiences of the participants.[75] Guided by this approach, we conducted an exploratory, inductive analysis similar to methods from previous work.[76] This type of analysis is well-suited for our semi-structured interview data focusing on pregnancy, where we interpreted participant responses through an iterative process.[73,74]

We used open coding, where one main coder (ARKD) read participant transcripts line-by-line, forming initial notes and definitions and then objectively organized personal narratives into similar experiences, grouping by phrase and keywords. An additional

coder (KM) reviewed these initial codes for clarity and qualitative accuracy. Next, we interpreted and refined the experiences shared by pregnant veterans and worked to understand the connections between emergent themes and their descriptions of how these experiences are shaped, using our explanatory sequential approach to support our quantitative findings and/or add new perspectives that were not garnered from our quantitative survey.[72] Findings were organized by clusters of superordinate and subthemes in a coherent order, retranslated into a narrative account, and considered in relation to quantitative results. Qualitative analysis was managed in ATLAS.ti version 8.2.30 (Scientific Software GmbH, Berlin, Germany).

FINDINGS

Quantitative Results

Women in our sample were on average 31.4 years of age (+/- 4.5), married (50.7%), white (52.1%), and deployed in the past (57.7%). Prenatal EPDS scores averaged 14.7 (+/- 4.0) (Table 3.1). Overall, the number of mental health visits increased slightly from the pre-pregnancy to pregnancy time periods, from 5.3 visits in the 280 days prior to pregnancy, to 6.1 visits during the 280-day pregnancy window (Wilcoxon signed-rank test p=0.18). Antidepressant use decreased from 40.1% in pre-pregnancy to 37.0% of our sample having received a similar prescription during pregnancy (McNemar's test for paired samples p=0.21).

A majority of our sample (69.7%) had at least 1 mental health visit or antidepressant prescription during pregnancy (Table 3.1). Past treatment for military

sexual trauma (MST) (χ^2 p=0.002) and drug abuse or alcoholism (χ^2 p=0.004), self-reported diagnosis of depression (χ^2 p=0.0002), PTSD (χ^2 p=0.002), mood disorder (χ^2 p=0.009), and bipolar disorder (Fisher's Exact Test p=0.02), past use of antidepressants (χ^2 p<.0001), and established care with a VHA mental health provider prior to pregnancy (χ^2 p<.0001) were significantly associated with at least 1 mental health visit or antidepressant prescription during pregnancy. Employment was associated with a decreased likelihood of a mental health visit or antidepressant prescription during pregnancy (χ^2 p=0.03) (Table 3.2).

A large proportion of our sample (81.7%) reported a past diagnosis of depression. Those reporting a history of depression were statistically more likely to score a prenatal EPDS≥13, suggestive of major depressive symptoms (68% vs. 42%, p=0.01). Women reporting no history of depression were more likely to be employed (54% vs. 32%, p=0.04), less likely to report treatment for military sexual trauma (19% vs. 43%, p=0.02), and less likely to report past diagnoses of PTSD, and bipolar, mood, and anxiety disorders (all p<0.05) (Table 3.3).

Care utilization was higher in women with a self-reported history of depression, with a greater number of mental health visits before and during pregnancy and a higher percentage of antidepressant use during these same time periods, with 75.9% of women with a history of depression having some VHA mental health care during pregnancy, compared to only 42.3% of women with no history of depression (p<0.001) (Table 3.2; Figures 3.2 & 3.3). This corresponded to women with a self-reported history of depression being 1.8 times more likely to receive at least one VHA mental health visit or

antidepressant prescription during pregnancy than women without a history of depression (data not shown; relative risk=1.8, 95% confidence interval=1.1-2.8).

Our sensitivity results indicated that the proportion of our sample with CDW data (n=135) who had mental health visits and/or antidepressant prescriptions varied depending on the pregnancy window we used (200-days, 280-days, or 300-days). The number of mental health visits increased as time windows were broadened. Receipt of an antidepressant prescription was present in 21.5% of women when examining a 200-day pregnancy window; when that window was expanded to 280-days and 300-days, 37% and 40% of women had received an antidepressant prescription, respectively. Women receiving at least one VHA mental health visit or antidepressant prescription increased slightly when comparing our 200- and 280-day windows (63.7% vs. 73.3%) but remained the same when comparing 280-day and 300-day windows (both 73.3%) (Appendices 3.5.1-3.5.3).

Qualitative Findings

We identified themes that captured the major concepts surrounding medication use during pregnancy, including themes relevant to mental health medication risk discussions with providers, use of mental health medications during pregnancy, and discontinuation of mental health medications during pregnancy (Table 3.4).

"Once I knew, I stopped." Many women reported discontinuing their medications when they found out they were pregnant. As one woman put it: "*Once I*

knew, I stopped taking everything…I just went off, completely off of everything, everything." One woman who had a planned pregnancy noted that she was trying to "*do better as far as managing (her depression)"* to *"prevent"* her from going back on medication while pregnant. Another woman stated that she "*kind of quit taking*" her antidepressants, but later informed her mental health provider and came up with alternative treatment plans.

Most participants indicated they made the decision to stop on their own. A number of participants reported not feeling comfortable with medication in general ("*I'm not a huge believer in long term medicated management for mental health*"), and even more so during pregnancy. Very few women in our sample expressed awareness of the risks of abruptly discontinuing their medications, although one participant did share her fears about the potential risks of being on medication and then subsequently weaning herself off too quickly.

A Coordinated Decision. Because the COMFORT prenatal interview took place following the participant's visit with her VHA provider for pregnancy confirmation, an opportunity for medication review and risk discussion existed. While many participants reported such discussions with their VHA providers or their obstetricians, collaboration between VHA providers and obstetricians was minimally reported and most participants were unsure whether information about mental health status was being transmitted between their VHA and obstetric providers. Those who spoke about coordinated discussions reported conferences with their OB and mental health providers to reach a

consensus on a treatment plan during pregnancy. One participant spoke about her mental health provider collaborating with her obstetrician to the extent of changing a medication so that both providers and the patient were comfortable with the treatment:

> *"The VA had done a great job of providing peer reviewed information saying their decision about why they think that certain medications are safe during pregnancy. And when that, I think professional opinion, didn't align with what the OBGYN thought they were very happy to basically concede and change the prescription."*

Another woman expressed satisfaction with the coordinated decision between her VHA provider and obstetrician to have her remain on her medication during pregnancy:

> *"She (VA nurse practitioner) was wonderful, she actually looked up the medications because she knew that I had gotten on the medications before I was breastfeeding. So we were very careful about getting on it and I was postpartum from my prior pregnancy, because I had back to back pregnancies they (VA NP and OB) both agreed about keeping me on the medication. She (VA NP) asked me to make sure that my OB was on the same page. And he already was so she was more than helpful. She actually went above and beyond."*

However, many participants reported not having a discussion with either their VHA mental health providers or their obstetricians, or having a discussion but remaining confused about potential risks during pregnancy. As one woman said:

> *"I think it was kind of a mutual decision, I had her tell me all of the risks and she went over all, you know, the different studies or whatever that she had pulled up and it just… I just thought (medication) sounded dangerous and it passed through milk and things like that, so I said I definitely wanted to get off (of) that."*

Another woman shared that her VHA primary care provider was not helpful when she asked about a mental health medication she was taking, and that she had done her own research to decide to discontinue her medication:

> *"I did my research online as far as all that went, like I said, when I (tried) to talk to my primary care…they really didn't have anything for me as far as… medical advice…nothing."*

Not Worth the Risk. Few women reported use of mental health medications during pregnancy. Women who were hesitant to start or restart a medication explained that potential risks to the fetus influenced their decision. Women spoke about medication being "very dangerous" and risky even if their providers suggested a prescription and assured them the risks were minimal. One participant said, "*I read all the manufacturing and the risks and everything and some of them said don't take while you're pregnant and so I didn't want to have any risks associated with it."* Another participant commented, *"I just don't take them. I stopped taking them, just because I didn't want any developmental issues or whatever with the baby."* Additionally, one woman added:

> *"Yeah, she's (provider) even mentioned like taking some antidepressants, but I told her, you know, I'm not a big person on medicine as it is, so I don't like to take medicine, especially like when I'm pregnant…You know because I just don't want to take the risk."*

One participant discussed stopping due to past experiences:

> *"Well, I was taking (medications) for mental health before I got pregnant, then I stopped when I found out I was pregnant cause I don't know, you know, how would that affect the pregnancy, cause I already had two previous miscarriages before this baby."*

Justifying Treatment. Women who spoke about taking medications during pregnancy seemed to include reasons for justifying their use. One woman spoke about her emotions being to "the extremes":

> *"(My emotions) were either really sad, tired, angry; where I either wanted to sit in bed all day or sit in the shower and cry all day, or if I was angry, I mean it was to the verge of wanting to hurt others. So my OBGYN she put me (on) the generic brand of Zoloft…it's helped drastically…I wasn't on any medications whatsoever until I got pregnant."*

Another woman who discontinued her medication during the first trimester but restarted later in pregnancy noted potential changes to her hormones as being the cause for returning symptoms:

> *"I stopped taking my fluoxetine when I found out I was pregnant. And I was, it was after I was twelve weeks that I started taking it again. I'm not sure the exact week but I remember the doctor said that after twelve weeks it would probably be okay for me to start taking it again. So things got a little bit rough…I don't know if it was the hormones that were a little more crazy but it definitely wasn't very good."*

Difficulties Adjusting to Life without Medication. Many women reported difficulties adjusting to life without medications to manage their depression. As one woman put it, she had to accept that her depression "*is going to be an occasional problem until after I have the kid.*" Others expressed that techniques to help manage depression were not as effective during pregnancy, or that traveling to mental health appointments had become more difficult since becoming pregnant. One woman said that although she was grateful for the techniques she learned in therapy, without medication "*it's just tough, it's really tough to manage that and just, you know, go almost a year without having any medication for it."* Very few women discussed starting therapy or utilizing other forms of treatment in place of antidepressants. One woman shared her hesitation about seeking care:

> *"Well, to be honest, all the things I've been through since I've been pregnant (has been with) my OBGYN…I haven't really spoke with my (VA) primary care provider or I haven't spoke with the therapist there…I don't know, like, and I know this might sound crazy, but it's like I don't feel too comfortable, I guess, discussing it, or I don't know how to bring it up, or stuff like that. I don't know."*

DISCUSSION

To our knowledge, this is the first study to examine mental health care and depression treatment during pregnancy in veterans with depression symptomatology. More than half of our sample had at least one mental health visit at the VHA or received a prescription for an antidepressant in the 280-days prior to delivery thus corresponding with the pregnancy period. However, nearly a quarter of our sample did not receive any VHA mental health care during their pregnancy. The majority of our participants (82%) reported using antidepressants at any time prior to their pregnancies, yet only 35% our sample filled a prescription for an antidepressant in the 280-days prior to delivery. We expected a large proportion of our sample would discontinue use because past research suggests women taking antidepressants prior to pregnancy discontinue use in the prenatal period.[77] Given that treatment for depression will likely decrease further following the birth of the child when time and childcare become barriers to treatment,[56] that medication recommendations change over the perinatal period, and that over half of perinatal depression cases develop prior to the postpartum period,[11] identifying at-risk and symptomatic women during pregnancy is key to developing a practical treatment routine.

We found that women self-reporting a history of depression were more likely to receive mental health care during their pregnancy, in line with previous work that showed

women veterans without a pre-pregnancy mental health diagnosis were less likely to seek outpatient mental healthcare during their pregnancies compared to women veterans with a pre-pregnancy mental health diagnosis.[43] Most women who received care in the pre-pregnancy period remained in care during pregnancy; however, women without past diagnoses may potentially be overlooked if depression screening is not done on a routine basis. The women veterans in our analysis who did not report a history of a depression diagnosis comprised 5% of all pregnant veterans in our sample with a prenatal EPDS≥10, suggestive of depression symptomatology.[53]

The frequency of care utilization among women veterans in our sample differed considerably between women with a self-reported history of depression compared to those with no self-reported history of depression. The VA Maternity Health Care and Coordination Handbook defines a standard of practice for maternity care coordination within VHA medical facilities, instituted to bridge the gap between existing dual VHA/non-VHA healthcare systems and designed to "ensure that eligible women Veterans have access to timely prenatal care…(and) seamless coordination of non-VA maternity care with VA care, especially in cases of women Veterans with co-morbid conditions who may require VA care during their pregnancy."[4] These guidelines also recommend depression assessment, screening, counseling, and referral for care as components of the coordination model. The guidelines specify that "VA providers must screen all pregnant and postpartum women for depression utilizing an appropriate screening tool, and have a system to ensure that positive screening results are followed by accurate diagnosis, implementation of treatment, and follow-up either within the practice

or through referral."[4] Given our quantitative findings showing that women without a history of depression were less likely to utilize care during pregnancy, conducting early and frequent depression screening, as well as establishing referral processes and introducing women without a history of mental health care to the mental health resources at the VHA is key for this population. Our results indicate that veterans experiencing depression symptoms may be lacking access to treatment, despite guidelines encouraging systems to identify these women and establish a care routine.

Veterans in our sample qualitatively reported varying experiences with mental health care treatment during pregnancy. While many women reported discontinuing medications after discussions of associated risks with providers, several women reported discontinuing medications on their own, without a risk/benefit discussion with their providers. This is consistent with other work showing that, in general, women tend to make a decision to discontinue medications during pregnancy without the benefit of a full discussion with their providers.[78] A lack of discussion between patients and providers may also be suggestive of reluctance that provider's may have with discussing and prescribing antidepressant during pregnancy,[57,79] despite patients preferring their providers initiate the discussion about medication risks during pregnancy.[80] Additionally, as has been reported in similar studies, the fear of harming the fetus often results in medication discontinuation during pregnancy.[81,82] The stigma surrounding medication use during pregnancy is pervasive. Previous work has found pregnant women expressing difficulties in accepting the need for a medication during pregnancy[78] given the prevalent focus on the health of the fetus as priority over the health of the mother[83,84] and without

recognition of the risks of untreated mental health conditions being associated with significant risk for mother and child. Our sensitivity analyses showed a greater number of antidepressant prescriptions in the 280-day and 300-day windows compared to the 200-day window when looking back from the date of delivery or estimated due date; this may be quantitative evidence that many women are discontinuing their antidepressant prescriptions early in pregnancy.

Our study is not without limitations. It is possible that women started taking an antidepressant or seeing a mental health provider following the prenatal interview, which ranged from 4-39 weeks gestation in our sample, and thus would not be captured in the self-report responses. Outside of the prenatal interview question specifically asking about antidepressant use prior to pregnancy, our interview included broad questions regarding self-reported receipt of mental health care rather than solely focusing on depression. Additionally, we may have included antidepressant prescriptions or mental health visits from the CDW data outside the actual pregnancy window, such as prescriptions filled in very early pregnancy which may have been stopped upon pregnancy confirmation. However, our sensitivity analyses using varying pregnancy windows of 200 and 300 days showed expected differences of increases in mental health visits and decreases in antidepressant prescriptions when our pregnancy time was varied. Likewise, we were unable to identify mental health care received during pregnancy from a non-VHA provider, which may explain our low specificity calculations. Given that most discordant cases were due to women self-reporting depression where it was shown absent in the EHR, this could potentially be due to diagnoses outside of VHA care (either before the

veteran was receiving VHA care or made by a provider outside of the VHA system). We also only included antidepressant prescriptions in our analysis. We chose to focus on depression symptomology for this paper; however, this potentially excludes a wide range of other mental health medications our participants may have been taking. Finally, our findings are not generalizable to a population outside of English-speaking pregnant veterans receiving their care within the VHA medical system.

Our study also has several strengths. We enriched our survey dataset with EHR data and examined the sensitivity and specificity of our participants self-reported history of depression diagnoses compared to EHR records. We used both quantitative and qualitative data to enrich our understanding of mental health care of pregnant veterans. We utilized a large, national sample to enroll participants. Additionally, we used the EPDS which has been validated as a screening tool for use in a pregnant population.[38] Finally, our qualitative data was obtained from semi-structured interviews, which gave the participants flexibility in their responses.

CONCLUSIONS

Estimates of depression prior to pregnancy in women veterans range from 10-60%, suggesting a higher likelihood of pregnant veterans developing depression compared to pregnant women in the general population,[6,19] and depression is the most commonly diagnosed medical condition among all women veterans ages 18-44.[22] The US Preventive Services Task Force (USPSTF) recently issued a draft recommendation that clinicians “provide or refer pregnant and postpartum women who are at increased risk of perinatal depression to counseling interventions.”[85] These recommendations are based on

lack of current guidelines for preventing perinatal depression, in light of evidence showing that counseling interventions can help improve perinatal depression outcomes. The USPSTF recommends identifying women at-risk for perinatal depression early, based on risk factors such as a history of depression, current depressive symptoms, and socioeconomic risk factors. Women veterans, especially given their increased risk of depression, could benefit from preventative therapy and other interventions targeting awareness around the importance of treating depression during pregnancy. These discussions should include non-pharmacologic and pharmacologic treatment options including balanced risk discussion addressing outcomes associated with untreated and treated disease. Our study reveals that treatment and care experiences vary among women veterans substantially. Women veterans without a history of depression may be less likely to receive care for depression symptoms during pregnancy. However, a majority of our sample with prenatal depression symptoms had at least one mental health visit or an anti-depression medication fill during their pregnancy window, suggesting that mental health care is available for women veterans when accessed.

IMPLICATIONS FOR PRACTICE AND/OR POLICY

Further work needs to be done to understand the extent of depression screening, medication adherence, and treatment options among veterans in the perinatal period, especially for pregnant women with new onset symptoms who may not have had a previous encounter with VHA mental health. Consistency in care, such as therapy for prevention of depressive symptomatology and standards of practice for medication risk

discussions, could help veterans and providers better manage depression during pregnancy as well as encourage long-term treatment.

TABLES & FIGURES

Figure 3.1: Time Periods of Mental Health Care/Antidepressant Prescription Identification from VHA Electronic Health Records

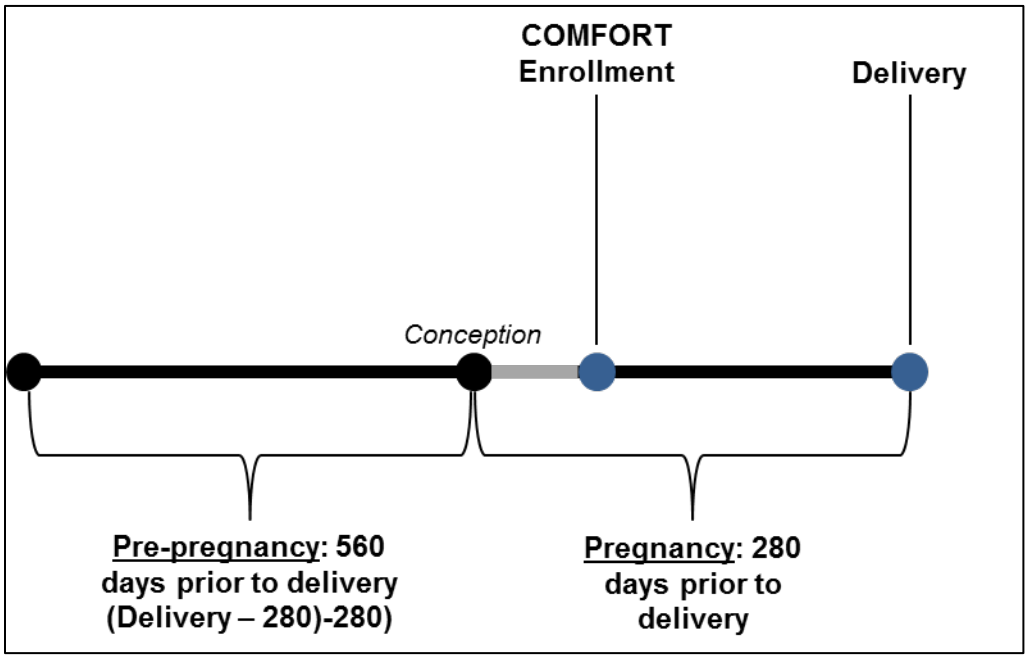


Table 3.1: Participant Characteristics (n=142)

COMFORT Survey Data	
	Total
Age at Prenatal Interview (Mean ± SD, Range)	31.4 ± 4.5 (22.4-41.7)
Married (N, %)	72 (50.7)
Race: White (N, %)	74 (52.1)
Hispanic or Latino/Latina (N, %)	22 (15.5)
Past Deployment (N, %)	82 (57.7)
OEF/OIF (N, %)	134 (94.4)
Prenatal EPDS (Mean ± SD, Range)	14.7 ± 4.0 (10.0-26.0)
Symptoms of Probable Major Depression, EPDS≥13 (N, %)	90 (63.4)
Weeks Pregnant at Prenatal Interview (Mean ± SD, Range)	23.0 ± 5.3 (4.4-39.1)
*Care Utilization from VA CDW Electronic Health Record**	
Mental Health visits, mean +/- SD (range)	
Pre-pregnancy	5.3 +/- 9.1 (0-45)
Pregnancy	6.1 +/- 9.4 (0-54)
Any Mental Health visits, n (%)	
Pre-pregnancy	79 (55.6)
Pregnancy	91 (64.1)
Antidepressant Prescription, n (%)	
Pre-pregnancy	57 (40.1)
Pregnancy	50 (35.2)
Any VHA Mental Health Care during Pregnancy (1+ mental health visit or antidepressant prescription in VA CDW EHR) (N, %)	99 (69.7)

Abbreviations: CDW: Corporate Data Warehouse; EPDS: Edinburgh Postnatal Depression Scale; OEF/OIF: Operation Enduring Freedom/Operation Iraqi Freedom; VA: Veterans Affairs; VHA: Veterans Health Administration

Note: Time periods calculated as Pre-pregnancy=(Newborn date of birth-280)-280; Pregnancy=Newborn date of birth-280

**n=7 participants were missing CDW data.*

Table 3.2: Factors Significantly Associated with Any VHA Mental Health Care during Pregnancy* (n=135)

	X^2, p-value	Relative Risk	Lower 95% CI	Upper 95% CI
Employed vs. Unemployed/Homemaker/Student/Other	4.99, 0.03	0.41	0.19	0.91
Treatment for Military Sexual Trauma (Yes vs. No)	9.90, 0.002	4.34	1.66	11.35
Ever Treatment for Drug Abuse or Alcoholism (Yes vs. No)	8.54, 0.004	-	-	-
Ever Depression Diagnosis (Yes vs. No)	13.50, 0.0002	5.09	2.03	12.74
Ever PTSD Diagnosis (Yes vs. No)	9.83, 0.002	3.45	1.56	7.62
Ever Mood Disorder Diagnosis (Yes vs. No)	6.90, 0.009	4.78	1.36	16.81
Ever Bipolar Disorder Diagnosis (Yes vs. No)	5.68, 0.01**	-	-	-
Ever Antidepressant Prescription Prior to Pregnancy (Yes vs. No)	17.43, <.0001	6.36	2.51	16.12
Plan to See VHA MH Provider during Pregnancy (Yes vs. No)	34.43, <.0001	35.44	7.44	168.73

**1+ mental health visit or antidepressant prescription in VA CDW EHR.*
***Fisher's Exact Test for small cell sizes.*
****No risk estimate computed for Ever Treatment for Drug Abuse or Alcoholism or Ever Bipolar Disorder Diagnosis due to no self-report of either past condition in the "no VHA care during pregnancy" group.*
Note: CI=confidence interval; PTSD=post-traumatic stress disorder; VA MH=Veterans Affairs Mental Health; n=7 participants were missing CDW data.

Table 3.3: Participant Characteristics by Self-Reported Past Depression Diagnosis (n=142)

Characteristic	No History of Depression (N=26)	History of Depression (N=116)	P-value
Probable Symptoms of MDD (Prenatal EPDS ≥13) (N, %)	11 (42.3)	79 (68.1)	0.01
First Pregnancy (N, %)	10 (38.5)	32 (27.6)	0.27
Current Employment Status (N, %)			
Employed	14 (53.8)	37 (31.9)	0.04
Unemployed/Homemaker/Student/Other	12 (46.2)	79 (68.1)	
Service-Connected Status (N, %)	22 (84.6)	103 (88.8)	0.39*
Ever Counseling/Treatment for Military Sexual Trauma (N, %)	5 (19.2)	50 (43.1)	0.02
Ever received medical treatment for drug abuse or alcoholism (N, %)	1 (3.8)	20 (17.2)	0.12*
Self-Reported Mental Health Diagnoses, Ever Diagnosed (N, %)			
Bipolar Disorder	0 (0.0)	16 (13.8)	0.04*
Other Mood Disorder	0 (0.0)	35 (30.2)	0.001
Anxiety Disorder	8 (30.8)	88 (75.9)	<.0001
PTSD	9 (34.6)	79 (68.1)	0.002
Schizophrenia	0 (0.0)	1 (0.9)	0.99
ADHD or ADD	0 (0.0)	13 (11.2)	0.13*
Eating Disorder	0 (0.0)	10 (8.6)	0.21*
Self-Reported Ever Diagnosis of Any Mental Health Condition** (N, %)	14 (53.8)	116 (100.0)	<.0001*
Self-Reported Ever Diagnosis of Any Mental Health Condition**, excluding depression (N, %)	14 (53.8)	94 (81.0)	0.003
Care Utilization			
Seeing MH provider when found out about pregnancy, self-reported (N, %)	7 (26.9)	62 (53.4)	0.03
Planned to see MH provider during pregnancy, self-reported (N, %)	7 (26.9)	68 (58.6)	0.36
Any VHA Mental Health Visits Pre-pregnancy (N, %)	7 (26.9)	72 (62.0)	0.0006

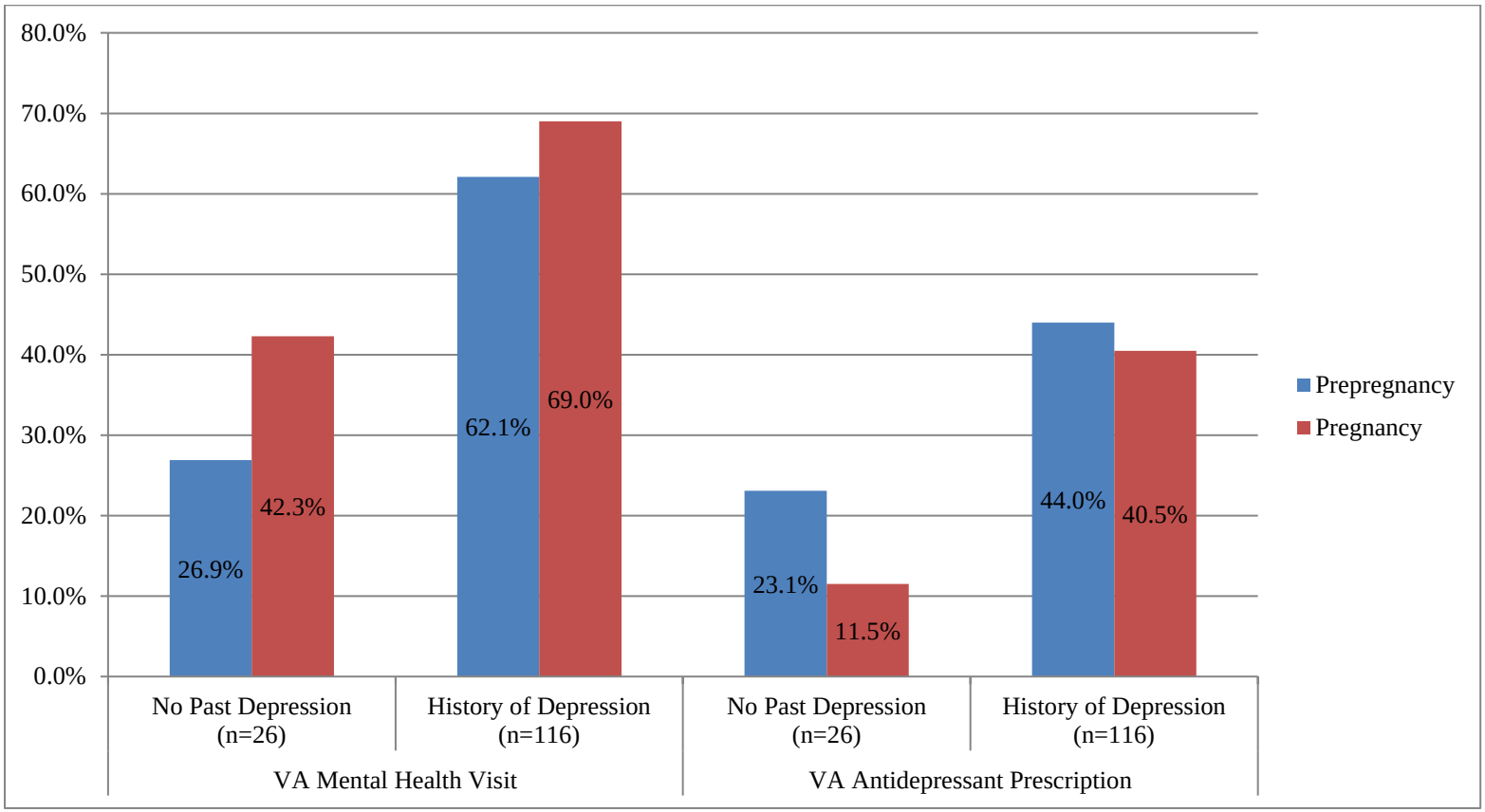
Characteristic	No History of Depression (N=26)	History of Depression (N=116)	P-value
Any VHA Mental Health Visits during 280-Day Pregnancy Window (N, %)	11 (42.3)	80 (69.0)	0.006
VHA Mental Health Visits during 280-Day Pregnancy Window (Mean ± SD, Range)	2.7 ± 4.7 (0-18)	6.9 ± 10.1 (0-54)	0.003*
Ever Prescribed Anti-Depressants, self-reported (N, %)	10 (38.5)	107 (92.2)	<.0001*
Mental health medication use at the time of prenatal interview, self-reported (N, %)	0 (0.0)	22 (19.0)	0.02*
VHA Antidepressant Prescription Pre-pregnancy (N, %)	6 (23.1)	51 (44.0)	0.04
VHA Antidepressant Prescription during 280-Day Pregnancy Window (N, %)	3 (11.5)	47 (40.5)	0.004
Any VHA Mental Health Care during Pregnancy (1+ mental health visit or antidepressant prescription in VA CDW EHR) (N, %)	11 (42.3)	88 (75.9)	0.0002

**P-value from Fisher's exact test for categorical variables; Satterthwaite test for unequal variances for continuous variables.*
***Any mental health condition variable includes self-reported ever diagnosis of any of the following: depression, anxiety, PTSD, mood disorder, ADHD/ADD, bipolar disorder, schizophrenia, eating disorder.*

Time periods: Pre-pregnancy=(Newborn date of birth-280)-280; Pregnancy=Newborn date of birth-280

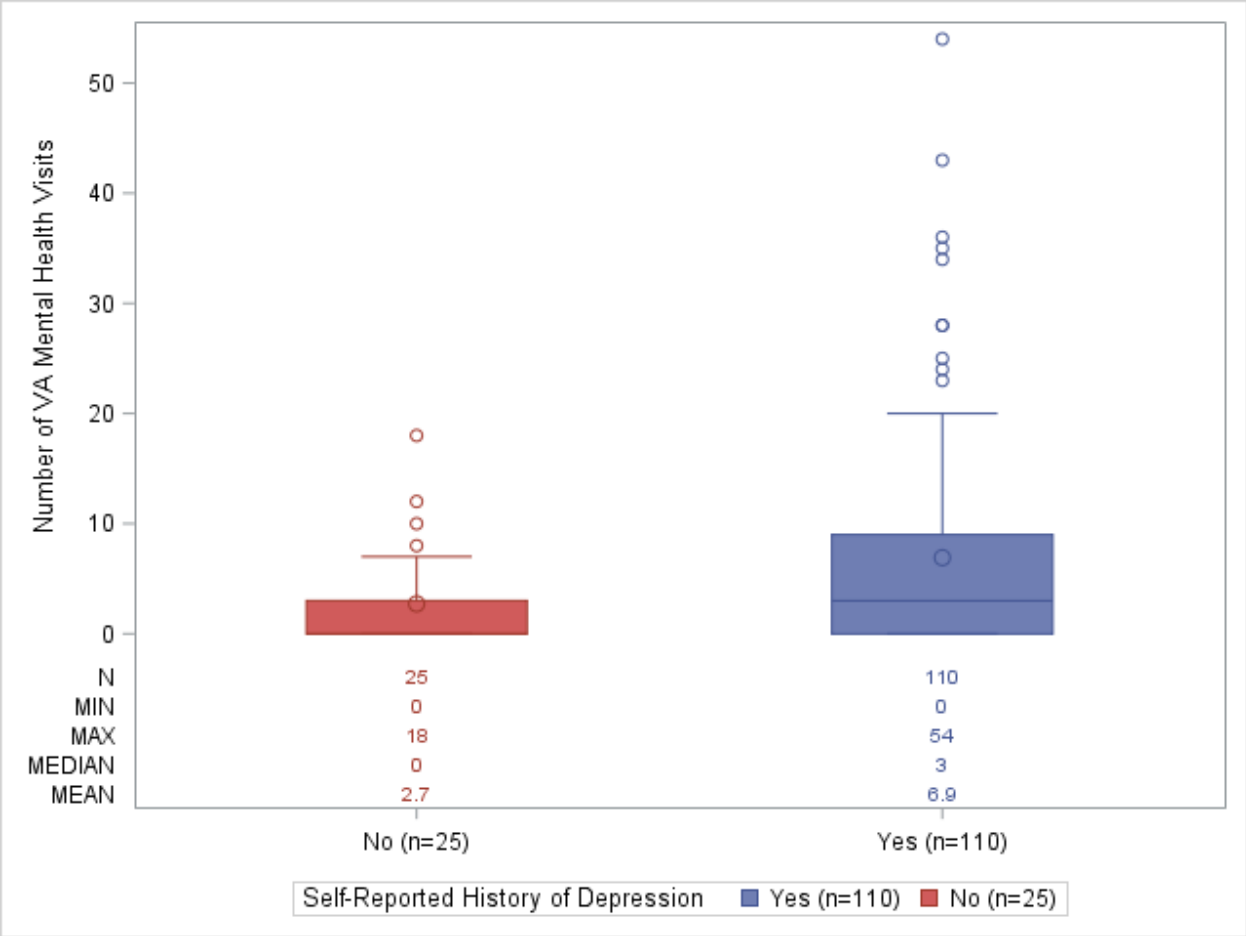
Note: n=7 participants were missing CDW data.

Figure 3.2: Mental Health Treatment Utilization*, by Pregnancy Period and Self-Reported Past Depression Diagnosis (n=135)



**Mental Health Treatment Utilization: 1+ mental health visit or 30-day antidepressant prescription in VA Corporate Data Warehouse Electronic Health Record Data. Note: 7 of our participants (n=1 with no past depression; n=6 with past depression) did not have CDW data; therefore this analysis was conducted in 135 participants.*

Figure 3.3: VHA Mental Health Visits* Recorded in the 280 Days Prior to Delivery, by Self-Reported Past Depression Diagnosis, among Pregnant Veterans with Depression Symptoms (n=135)



**As recorded in the VA Corporate Data Warehouse Electronic Health Record Data*

Note: 7 of our participants (n=1 with no past depression; n=6 with past depression) did not have CDW data; therefore this analysis was conducted in 135 participants.

Table 3.4: Categories, Example Codes, and Themes Identified from Qualitative Interviews with Pregnant Veterans with Depression Symptoms (n=42)

Category	Example Codes	Themes
Medication Risk Discussion with Providers	• Communication between obstetrician and VHA provider • Occurred with obstetrician • Occurred with VHA provider • Personal understanding of risks	A Coordinated Decision
Use of Medications during Pregnancy	• Continued medication use • New medication use	Justifying Treatment
Discontinuation of Medications during Pregnancy	• Alternative treatments • Feelings about stopping • Personal decision • Provider Decision	"Once I knew, I stopped" Not Worth the Risk Difficulties Adjusting to Life without Medication

CHAPTER IV: BRIDGING THE GAP FOR PERINATAL VETERANS: CARE BY MENTAL HEALTH PROVIDERS AT THE VETERANS HEALTH ADMINISTRATION

ABSTRACT

BACKGROUND: Pregnant women veterans receive maternity care from community obstetricians but continue to receive mental health care within the Veterans Health Administration (VHA). Our objective was to explore the experiences of VHA mental health providers with pregnant and postpartum veterans.

METHODS: Mental health providers (n=33) were identified at 14 VHA facilities across the US. Semi-structured interviews were conducted over the phone to learn about provider experiences with perinatal women veterans and their perceptions of depression screening and mental health treatment management for pregnant and postpartum veterans receiving mental health care within the VHA system.

FINDINGS: Providers identified absence of screening protocols and referral procedures and variability in risk/benefit conversations surrounding psychotropic medication use as important areas of weakness for VHA mental health care during the perinatal period. Care coordination within facilities, primarily through Primary Care-Mental Health Integration teams, was identified as a main facilitator to promoting better mental health care for perinatal veterans.

CONCLUSIONS: Mental health providers caring for veterans during the perinatal period identified several areas where care could be improved, notably in screening and referral processes. Given the presence of strong internal care coordination examples already in place at many VHA facilities, improving access to mental health care for perinatal veterans is likely feasible.

BACKGROUND

The number of reproductive-aged women veterans utilizing Veterans Health Administration (VHA) benefits to pay for maternity care is increasing.[3] Because few VHA hospitals provide prenatal care, nearly all maternity care for veterans is provided by external obstetrical providers through the Veterans Affairs (VA) Community Care program, which pays for prenatal and maternity care coverage at community-based obstetrical providers.[3–5] However, veterans often continue to receive mental health care from VHA mental health providers during the perinatal period, which encompasses pregnancy and the first postpartum year.[6,86] It remains unclear on how women veterans navigate their pregnancy and postpartum mental health care and whether they are receiving adequate screening for perinatal depression.

In an effort to ensure pregnant women have access to community-based obstetrical care while continuing to receive ongoing VHA care as needed, the VHA issued maternity health care and coordination procedures with VHA Handbook 1330.03. The guidelines are designed to bridge the gap between the existing dual VHA/community healthcare systems and to "ensure that eligible women Veterans have access to timely prenatal care…(and) seamless coordination of non-VA maternity care with VA care, especially in cases of women Veterans with co-morbid conditions who may require VA care during their pregnancy."[4] This includes coordination of “non-VA maternity care with relevant VA providers” as well as coordination between internal VA providers. A model for this internal VHA provider coordination is Primary-Care Mental Health Integration (PC-MHI). PC-MHI teams are composed of and are often co-located with

primary care and mental health providers; they were established to promote collaboration between disciplines to promote the effective treatment of common mental health disorders, including depression.[87] PC-MHI models have been previously associated with greater identification of mental health diagnoses.[88] PC-MHI models are utilized for all veterans, but provide a framework for the specific care of pregnant and postpartum veterans.

Depression screening, assessment/diagnosis, and treatment, including counseling and referrals to care, are included as components of the maternity health care guidelines, and are necessary to proceed through on the depression care pathway to improve symptomatology and maternal/child outcomes. VHA Handbook 1330.03 specifies that "VA providers must screen all pregnant and postpartum women for depression utilizing an appropriate screening tool, and have a system to ensure that positive screening results are followed by accurate diagnosis, implementation of treatment, and follow-up either within the practice or through referral."[4] The VA/DoD Clinical Practice Guideline for the Management of Pregnancy is referenced for further details on specific screening tools and referral processes. Depression screenings in the VA/DoD guidelines are recommended to be conducted “using a standardized tool such as the Edinburgh Postnatal Depression Scale or the 9-item Patient Health Questionnaire periodically during pregnancy and postpartum,” with periodic screening defined as once each in the first trimester, third trimester, and postpartum.[29]

Studies have shown that screening for depression is enough of an intervention to increase the rate of mental health care during pregnancy and the postpartum period [36],

and in general, that perinatal depression screening is acceptable to patients.[89] VA clinical care guidelines recommend depression screening at the initial preventative medicine visit, a visit required by the VHA to confirm pregnancy and initiate maternity care benefits.[4] However, mental health providers are not involved in this screening and it is unknown if they receive referrals through the initial visits when this screening may take place. Additionally, as the onset of perinatal depression can occur at various times over the course of pregnancy and the year postpartum,[11] screening for depression at multiple times in the perinatal period is important to facilitate early engagement with mental health care. Because women veterans with depression may find it burdensome to seek care in a complex dual healthcare system during pregnancy,[90] a proactive approach to contacting veterans for screening may be needed.

Our objective was to explore the experiences of VHA mental health providers with pregnant and postpartum veterans as well as their perceptions regarding depression screening and mental health treatment management during the perinatal period. We used semi-structured interviews with mental health providers from VHA facilities across the US to better understand typical mental health care and treatment experiences and to explore instances of care coordination occurring at their facility.

METHODS

Mental health providers (including psychologists, social workers, and psychiatrists) were identified from facilities participating in a larger cohort study, the Center for Maternal & Infant Outcomes & Research in Translation (COMFORT), which

recruited pregnant veterans from VHA facilities across the US. Our sample was purposively selected, with the goal to interview at least one, but ideally two or more, providers from each of the 14 COMFORT study facilities. The lead facility investigator for the COMFORT study provided contact information for mental health providers with experience working with pregnant and postpartum veterans at their respective facility. Additionally, several providers were referred to COMFORT research staff directly by other study participants. After receiving contact information, COMFORT research staff contacted providers via email to provide information about the study and the topics to be covered, and to schedule interviews. The interview guide utilized for the study (Appendix 4.1) was developed by COMFORT investigators and refined after pilot interviews. Interviews took place between August 2017 and February 2018.

Semi-structured interviews were conducted over the phone at a time that was agreeable for the mental health provider. Semi-structured interviews allowed for greater spontaneity for the providers to discuss their thoughts and experiences working with pregnant and postpartum veterans. After describing the study and receiving verbal consent from the mental health provider to have the conversation recorded, interviews started with "grand tour" questions to orient the mental health provider to the topic, such as: “Could you tell me more about your current job responsibilities?” and “How often do you work with women before, during, or after pregnancy?” These opening questions were followed by probes to learn more specific details of the mental health provider’s experiences with perinatal women veterans. Demographic and occupation characteristics were collected from each provider at the end of the interview.

Interviews lasted around 30 minutes. They were digitally recorded to capture verbatim content, and professionally transcribed. All data were stored on a secure password-protected VHA server. Recordings were destroyed upon verification and confirmation of complete interview notes. COMFORT was approved by the Veterans Administration Central Institutional Review Board (CIRB). Only study staff with CIRB approval could access the transcripts and audio data.

ANALYSIS

We used a conventional content analysis to identify initial coding categories directly from the interview data.[91] Each transcript was read by a primary coder (ARKD) to identify emergent themes. Findings were organized by clusters of superordinate and subthemes in a coherent order and retranslated into a narrative account. A second coder (KM) reviewed themes for qualitative accuracy. A final coding structure, consisting of 49 codes, captured the major concepts in the data. The themes included in the present analysis emerged from codes describing the use and discontinuation of mental health medications during pregnancy, risk discussions surrounding mental health medication use during pregnancy and postpartum, depression screening and protocol adaptation, and care coordination, all within the context of the guidelines in VHA Handbook 1330.03.

Qualitative analysis was managed in ATLAS.ti version 8.2.30 (Scientific Software GmbH, Berlin, Germany).

FINDINGS

Sample Characteristics

We conducted a total of 31 interviews with 33 providers. Two of our interviews took place with two providers from the same facilities simultaneously. One provider did not want her interview recorded. Therefore, our analysis included 30 transcripts. Of the 54 total providers contacted, 45 were eligible for an interview. Our overall participation rate was 73%. Of those providers who did not participate in an interview, the most common reason was non-response to invitation emails (67%) (Figure 4.1). Interviewed providers were predominately female (97%) and white (82%) and were on average 45 years old with 10 years of VHA work experience (Table 4.1). At least one provider was interviewed from each of the 14 COMFORT facilities; most facilities (87%) had two to four providers participating in interviews. Providers mainly included psychologists, psychiatrists, and physicians (73%) (Table 4.2). Our sample included both prescribers and non-prescribers. Prescribers included any provider, such as psychiatrists, physicians, and nurse practitioners, able to prescribe antidepressants and other medications. Non-prescribers included Licensed Clinical Social Workers and others who provide counseling but not prescription medications to their patients. Providers reported varying frequency in working with pregnant and/or postpartum veterans, with some seeing perinatal veterans often and others treating only a handful of perinatal veterans throughout their career.

Qualitative Findings

Providers spent a substantial amount of time discussing care coordination, general care experiences, and usual treatment experiences with perinatal patients (Table 4.3). Absence of screening protocols, referral procedures, and variability in risk/benefit conversations surrounding psychotropic medication use were identified as important areas of weakness for VHA mental health care during the perinatal period. Primary Care-Mental Health Integration teams were identified as a main facilitator to promoting better mental health care for perinatal veterans. From our final coding categories we identified the following themes: Wide Variation in Screening of Pregnant Women Across Facilities, Inconsistencies in Treatment Decision-Making, Lack of Communication with Obstetricians, and Coordination through PC-MHI Teams. Below we outline these findings, grouped by thematic category.

Wide Variation in Screening of Pregnant Women Across Facilities

Many providers expressed concern that depression screening, diagnosis, and treatment were occurring too infrequently, and thus were concerned about missing opportunities for women to get care. Providers reported frequent contact with women they had been seeing prior to pregnancy but only a few new onset depression cases. One provider acknowledged that new onset cases of depression in perinatal veterans, "may definitely be slipping through the cracks." Another provider expressed her concern that screening was not done frequently enough to identify depression, especially for women who may not be aware of depression symptoms or risk factors:

> *"I mean I think we know that there's probably underdiagnosed (and) underreported (cases)… it's supposed to be this ideal time and they have this*

> *wonderful life event that just happened and so I think it can be hard to acknowledge that 'yeah I'm sometimes feeling kind of down and/or having difficulty', so I think if we more routinely did it (screened for depression) we would probably catch some cases we're not aware of right now."*

Additionally, many providers spoke of depression screenings being done on the same schedule for all veterans, and not necessarily being aware that any extra were being done for prenatal or postpartum women. Providers expressed frustration with the lack of a formal referral process in place; many noted that women Veterans in need of mental health were mentioned to them during conversations with the maternity care coordinator or another person conducting perinatal depression screening rather than through a standardized referral process.

Providers also believed they might be missing perinatal patients experiencing symptoms when the screenings were done by maternity care coordinators who were too overburdened with other duties to conduct routine screens. One provider expressed her concerns regarding screening, identifying a lack of training among those conducting the screens, and lack of a protocol or standard procedures for referrals for positive screens:

> *"The mental health symptom screening measure that they use at our facility is the PHQ-2, which I think is pretty inadequate to capture not only depressive symptoms but also anxiety, posttraumatic stress, and just other realms of distress that may emerge during the perinatal period…and it may be that the maternity care coordinator here just doesn't have a ton of experience or confidence working with psychiatric distress."*

There was also uncertainty around screening procedures and standards. Some facilities identified routine screens with the Patient Health Questionnaire (PHQ) or Edinburgh Postnatal Depression Scale (EPDS), while others were unsure which screening test was used. Few providers knew who was conducting screening at their facility,

whether by primary care providers or maternity care coordinators, or if it was done regularly. A few providers noted the lack of MCCs at their facilities, making routine screening more challenging due to lack of personnel resources.

Inconsistencies in Treatment Decision-Making

Providers spoke of the importance of conducting a risk/benefit analysis regarding psychotropic medications to determine the best plan of treatment for each individual patient; however, no providers identified standard policies, procedures, or protocols for a mental health medication risk discussion with their pregnant patients. One provider explained:

> *"I think every, every medication that the patient is on is evaluated within the context of pregnancy. You know, like some things are like just absolutely contraindicated. And then there are things that are…like ideally you wouldn't be on but you would perform a risk/benefit ratio, like there's animal data that shows that this could be a problem in pregnancy but…you know you have to sort of weigh the risk/benefit ratio, given the patient's underlying psychiatric condition."*

Providers shared that their patients were receptive to these conversations and "trust(ed) the provider to know" about medication safety and associated risks during pregnancy. One provider explained in detail the risk/benefit conversation she has with her patients, with her patients typically "really open" to her recommendations. Many providers noted that medication alone was not enough to treat complex mental health issues, especially during pregnancy, and recommended evidence-based therapies for their patients. Providers found that having these discussions prior to pregnancy with existing patients could lead to "better options" in terms of timing for discontinuation of medications or for finding alternative treatment strategies.

Providers spoke candidly about being respective and supportive of the choices their patients ultimately made, as there was wide variability reported around women deciding to continue or discontinue antidepressants during pregnancy. Many providers noted the influence of societal and cultural pressures to go off medications during pregnancy, despite the necessity for some patients. As one provider said:

> *"It varies depending on how severe their illness is. I would say the more ill the woman is and the more she realizes that she's likely to get really sick if she goes off her medications, the more likely they are to say 'I'm going to stay on these'. The women who haven't been as sick or don't have as much insight into how sick they've been are more likely to say 'I'm going to go off these'. But there's definitely a societal pressure to go off medications when you're pregnant. Women tend to prioritize the baby over their own mental health."*

Another provider similarly noted that she often finds her patients having anxiety about "how to do a good job and follow the rules during pregnancy."

One provider, a non-prescriber, commented on the unique experiences of veterans as being important to take into account when having a risk/benefit discussion:

> *"I always frame it like, 'if you'd like to talk with a psychiatrist and learn about what your options are, would you like that? No pressure, you don't have to take anything if you don't want to, but at least to give you an idea of why you're feeling really depressed right now…(and) find out what your options are, and what the options are that are going to create the least amount of risk for you and for your baby…would you like that?' And if a person says 'yes I would', then I'll schedule the appointment. And I really try to frame it that it doesn't mean you have to commit to anything, think of it just as a consultation. And I think that really takes the pressure off of the Veteran to feel like they're going to be pushed in one way or the other, to know that they have the freedom to make a choice, and I think that's really important for any of us, but especially with trauma survivors and Veterans."*

Similarly, this same provider expressed the necessity for a "gentle" conversation when encouraging a patient to start a medication:

> *"Very often it involves, depending upon the severity of the depression, a significant conversation around medication, which can be difficult, particularly if they're breastfeeding and that's, you know, something that's personally or culturally important to them…Sometimes it's…a reframing of self-care as being important for the care of the infant. You know so often they think that they're not as important, and we talk about how, you know, that their infant relies on them entirely for their wellbeing and if they're not well that that has implications for the infant. So sometimes conversations about, you know, in a gentle way, never in a way that implies, you know, guilt or shame or anything like that."*

Many of the providers discussed the alerts within VHA patient electronic medical records that flag pregnant veterans. They found these clinical alerts to be very helpful in facilitating discussions regarding medication use with their patients and other providers. This was especially important because many providers spoke about a lack of specific psychiatrists or pharmacists within their facility that did medication reviews for pregnant veterans on a regular basis.

Lack of Communication with Obstetricians

When probed about communication with obstetricians, very few providers shared experiences with such contact. Many providers stated difficulties in attempting to contact obstetricians and felt that even if they reached out to obstetricians they rarely received communication back or had difficulty receiving information due to patient privacy releases. Some providers recalled experiences of complex patient cases requiring communications with the obstetrician, exemplified by one provider who stated that "only in more complicated cases have I actually had contact with the obstetrician." Many providers expressed frustration over not having better communication with obstetricians,

especially when it came to psychotropic medication use during pregnancy. As one mental health provider explained:

> *"I don't necessarily know what the OB is doing, because there's not real good communication when the OB care is farmed out, that's the biggest problem and the biggest barrier I would say…Rarely do I get communication from the OBGYN. And a lot of obstetricians are very uncomfortable with mental health medications, so I never know how comfortable they are with what I'm doing."*

Many providers spoke of the benefit that having an obstetrician on staff would be for their VHA facility. One provider believed the addition of obstetrical care would ultimately benefit mental health, as well:

> *"Our VA (gynecologist) does zero care for pregnant Veterans regarding their pregnancy, and so there's no (obstetrical) care at all provided in house. And so just from an emotional standpoint, a Veteran who has to go to multiple different hospitals…I think that's normal for many civilians, but for Veterans I think it would be really good for them to have their care at their VA...I think it would just reduce stress…(and) improve communication and that ultimately would help their mental health."*

Coordination through PC-MHI Teams

Several providers discussed the availability of PC-MHI models at their facilities. This model of care coordination and care personalization for veterans receiving care within the VHA was identified by providers as promoting mental health care among perinatal women. Despite a lack of coordination with non-VHA providers and discussions surrounding a need for greater screening and diagnostic practices, providers were in general very positive about their experiences with their VHA colleagues. Many mentioned proximity to women's health providers, specifically primary care providers, as

being an advantage for coordinated care. Often providers noted “easy access” to women’s primary care providers for sharing information regarding patients who may need extra care. Many providers shared such experiences:

> *“It’s really well coordinated in the women’s clinic here, where mental health is co-located in the primary care clinic and there’s monthly team meetings and there’s like a lot of chatting, you know, in offices or just around, like ‘hey I want to talk to you about somebody who stopped by.’ And so, yeah, I would say that there’s a lot of conversation between primary care providers and the mental health providers.”*
>
> *“In general, our clinic works pretty hard on coordinating care between primary care and mental health… so there’s a good amount of communication about those kinds of things.”*
>
> *“Since I work in the integrated women’s clinic, we have very good communication, we have a team meeting every week. So that communication with their primary care physician here is very good.”*
>
> *“If somebody is in distress or is starting, or struggling, (primary care) will refer them over to us. And then I try to get in the people who are pregnant or who are postpartum very quickly.”*

One provider reported that having access to patient records from the initial pregnancy confirmation visit with the veteran’s primary care provider allowed her team to develop a plan for screening and treatment initiation:

> *"The project that we came up with was any time that the Women Veteran’s Program Manager gets alerted to a newly pregnant Veteran…(we) do a brief chart review using a sort of checklist of looking for some evidence-based risk factors that we’ve identified from the literature. And kind of based on the number and severity of the risk factors that we identify in the chart review, we then follow-up either with information about mental health services, like that’s the lowest level intervention is to mail somebody information about mental health services in our clinic and what we do, and just like a little bit about kind of things to look out for, like postpartum depression and stuff like that, and, you know, stuff about eligibility and all that. And then the higher-level intervention would be for us to*

> *do an outreach call and strongly encourage them and sort of provide them with some psychoeducation about their risk factors and stuff like that...We've (also) developed a screening tool for folks that come in for an intake after that process, and also a semi structured interview before that."*

DISCUSSION

Our results showed variation across facilities and providers in terms of standardized screening and treatment practices; however, coordination between primary care and mental health providers was widely reported to be a strong facilitator to providing mental health care to perinatal veterans. Mental health treatment is complex during the perinatal period and care, especially regarding medication use, and needs to be at an individualized case-by-case level. However, certain policies for depression screening, referrals to mental health providers for symptomatic veterans, and medication review could be better encouraged to improve standardized care across the VHA. Nearly 40% of the providers we contacted who declined to participate in an interview cited lack of caring for pregnant or postpartum veterans although they were identified as providers who work with veterans during the perinatal period. This suggests an absence of knowledge within sites on which mental health providers are caring for perinatal veterans, given the identification of these providers as potential participants.

During the pregnancy confirmation visit, Handbook 1330.03 specifies a psychosocial-risk assessment take place with screening for depression and other psychiatric illness, with appropriate referrals made based on the results of this screening to confirm diagnosis and begin care. Because veterans must visit the VHA to confirm their pregnancy prior to receiving their maternity care benefits,[4] VHA providers have a

unique opportunity to engage their pregnant patients with mental health care. As veterans are a high-risk population for mental health complications in and following pregnancy, current recommendations for preventing depression in high risk women suggest engagement with therapy even if initial depression screens are negative.[85] Previous work has shown that integrating perinatal depression care into outpatient obstetric settings is feasible, effective, and acceptable[54]; it is likely that this would also be true with the VHA mental health system with better coordination from screening to care. Developing protocols to standardize processes for depression screening and timing of screenings during pregnancy is an important initial step in creating an integrated system of perinatal depression care.

Wide variation also existed across facilities for medication risk/benefit discussions. Providers were unable to identify standards of care for such discussions or recommendations for medication use or discontinuation among pregnant veterans. Past research has shown that pregnant women prefer providers to lead the discussion and decision-making process on medication risks during pregnancy.[80] Additionally, pregnant women have reported feeling more comfortable with antidepressant use during pregnancy after a more in-depth conversation with their provider.[92] Previous work in this area has shown that in general, women feel that medication use for depression is acceptable during pregnancy, but many stop their own depression medication upon pregnancy confirmation.[79] Other studies have shown that depressed prenatal women often have trouble with decisional conflict regarding antidepressant use during pregnancy, and that

there is greater treatment adherence among patients whose providers offer more decisional support.[93]

Lack of coordination between mental health providers and offsite obstetricians was identified as one of the greatest facility-level barriers to quality depression care. Similar to these findings, previous work has shown that systems-level barriers to perinatal mental health care include a lack of collaboration and communication between obstetrical and mental health providers.[94] The VA maternity care coordination guidelines mandate a maternity care coordinator (MCC) at each facility who is charged with tracking maternal and fetal outcomes, coordinating services for pregnant veterans, and coordinating care for comorbid conditions such as depression. However, a substantial amount of time is required from MCCs to provide adequate services for pregnant veterans. Many of the providers reported part-time MCCs at their facilities, with MCCs balancing their primary role within the VHA with the additional work of perinatal care coordination. Previous pilot work has found that a centralized, telephone-based maternity care coordinator to cover multiple VHA facilities resulted in high patient satisfaction, especially with regard to understanding VHA services and benefits. A similar program implemented across a greater number of VHA facilities could provide a centralized location for depression screening and local referrals.[51]

We acknowledge that our study was limited by only including the perspectives of VHA mental health providers. Our sample size was relatively small and is not representative of all VHA mental health providers. Interviews with maternity care coordinators or obstetricians may help provide a more complete picture of the mental

health care pregnant and postpartum veterans are receiving. We were limited to the VHA sites working with the larger COMFORT study and the perspectives of mental health providers at these sites; therefore, these findings cannot be generalized to all VHA medical facilities or mental health providers caring for pregnant and postpartum veterans.

Our study has numerous strengths. We conducted interviews with a sample of VHA mental health providers across the US. We utilized a semi-structured interview guide for greater flexibility in participant responses. Our providers had many years of experience working in the VHA. Additionally, we interviewed a wide variety of providers, (including both prescribers and non-prescribers), which gave us a more complete picture of the care pregnant and postpartum veterans are receiving.

CONCLUSIONS

Mental health providers caring for veterans during and after pregnancy identified several areas where care could be improved, notably in screening and referral processes. Given the strong internal coordination already in place at many VHA facilities, such as through PC-MHI teams, improving access to mental health care for perinatal veterans is likely feasible.

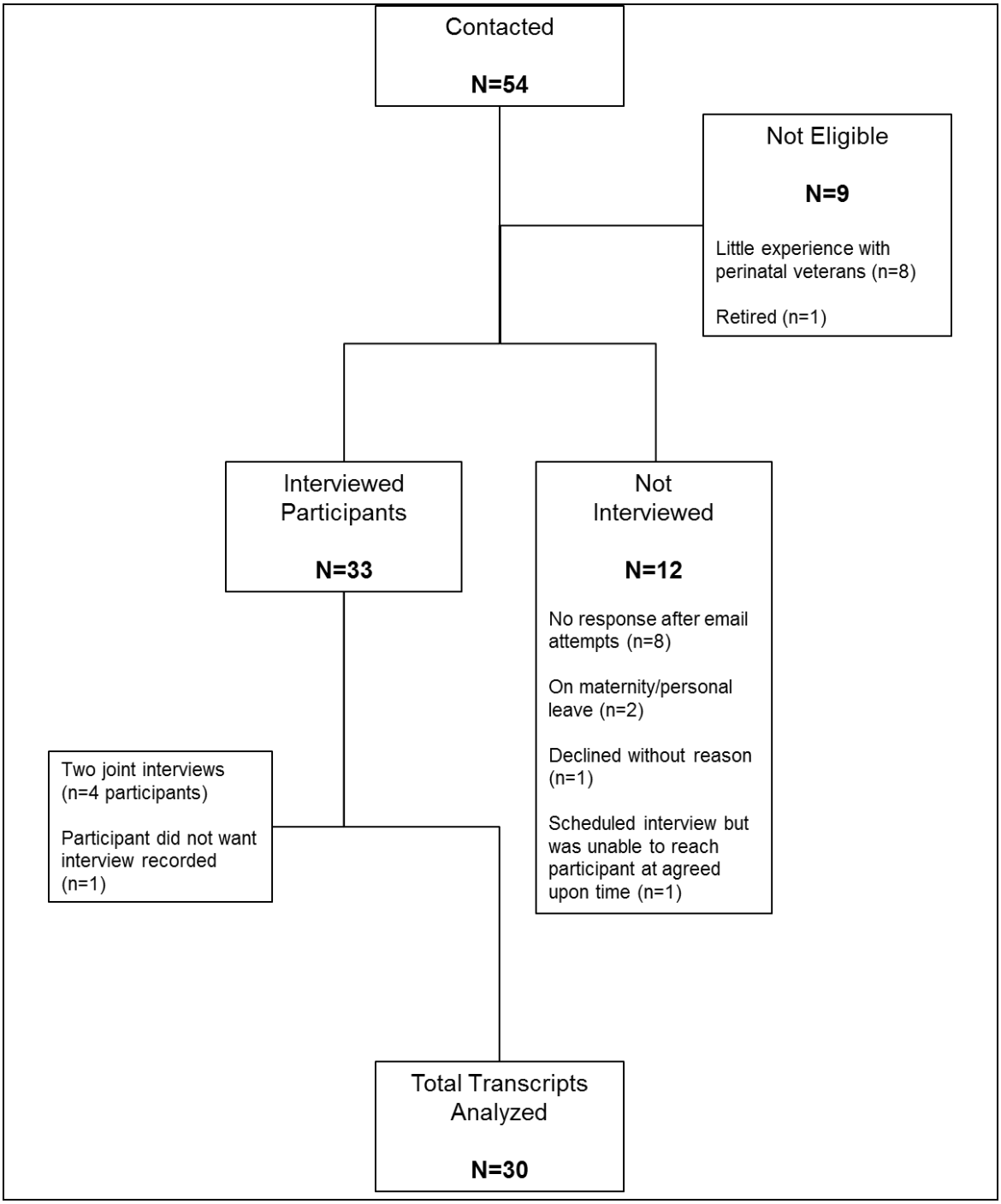
IMPLICATIONS FOR PRACTICE AND/OR POLICY

This study has shown that a refinement to current guidelines to specify standard screening tools, screening schedules, and referral processes could potentially engage a greater number of pregnant women in VHA mental healthcare. The availability of

standard protocols or trainings for medication risk/benefit discussions would also benefit both mental health providers and perinatal veterans. Additionally, providers included in our study identified several key areas where policy changes, whether at the national VHA level or at individual facilities, could be implemented to increase access and ease barriers to mental health care for perinatal women.

FIGURES

Figure 4.1: Provider Contact and Interview Response Chart



TABLES

Table 4.1: Number of Interviews Completed and Types of Providers Interviewed by Site

Site	Types of Providers Interviewed (n)*					Total Number of Interviews Completed (n)
	Psychiatrist	Psychologist	LCSW	Nurse/Nurse Practitioner	Physician	
Durham, North Carolina	✓	✓	✓			4
New Orleans, Louisiana	✓		✓	✓		4
Minneapolis, Minnesota		✓		✓		3
Los Angeles, California		✓				3
Iowa City, Iowa	✓	✓				3
Dallas, Texas	✓			✓		2
Denver, Colorado		✓		✓		2
Fargo, North Dakota		✓				2
West Haven, Connecticut	✓	✓				2
Boston, Massachusetts	✓	✓				2
Leeds, Massachusetts		✓			✓	2
Tampa, Florida	✓					2
Little Rock, Arkansas			✓			1
Reno, Nevada			✓			1
						33

**Note: LCSW=licensed clinical social worker; specific roles included Chief of Mental Health for the Women's Health Clinic, Women's Health Medical Director, Chief of Mental Health, MST Coordinator, primary care integration team member, Women Veterans Program Manager, Service Chief of Mental Health Clinic*

Table 4.2: Sociodemographic Characteristics of Participants

Variable	Total (n=33)
Age (years), mean +/- SD	45.1 +/- 9.9
Gender, n (%)	
Female	32 (97.0)
Male	1 (3.0)
Race, n (%)	
White	27 (81.8)
Black	2 (6.1)
Other	4 (12.1)
Ethnicity, n (%)	
Non-Hispanic	32 (97.0)
Hispanic	1 (3.0)
Educational Background or Licensure, n (%)	
PhD/PsyD	14 (42.4)
MD	10 (30.3)
LCSW	5 (15.2)
Nurse	3 (9.1)
Nurse Practitioner	1 (3.0)
Number of years worked with the VA, mean +/- SD	10.2 +/- 7.7
Number of years worked at current VA, mean +/- SD	8.8 +/- 8.0
Geographic characterization of VA location, n (%)	
Rural	3 (9.1)
Urban	23 (69.7)
Suburban	7 (21.2)

Abbreviations: PhD/PsyD=Doctor of Philosophy/Psychiatry, MD=Medical doctor, LCSW=Licensed Clinical Social Worker

Note: Other races included Indian, European American and American Indian, Caribbean American, Asian; specific nursing categories included 1 RN, 1 BSN, and 1 MSN.

Table 4.3. Theme Groupings & Associated Codes Identified by Providers describing Experiences of Mental Health Care Management for Veterans during the Perinatal Period

Theme Grouping	Associated Codes
CARE EXPERIENCES	• Typical timing of mental health care • Depression screening • Standards of care/guidelines
TREATMENT EXPERIENCES	• Medication review during pregnancy • Medication risk discussions • Medication use during pregnancy • Medication discontinuation
CARE COORDINATION	• Care coordination with other VHA providers • Care coordination with obstetricians

CHAPTER V: DISCUSSION AND CONCLUSIONS

PURPOSE AND SPECIFIC STUDY QUESTIONS

Perinatal depression affects a substantial number of women in the general population,[8–13] and can have long-term consequences on both mothers and infants.[15,16] History of depression is a risk factor for perinatal depression;[18] depression is the most commonly diagnosed medical condition among all women veterans ages 18-44.[22] Estimates of depression prior to pregnancy in women veterans range from 10-60%, suggesting a higher likelihood of pregnant veterans developing depression compared to pregnant women in the general population.[6,19] Despite these statistics, little work has been done in identifying the occurrence of or treatment modalities for perinatal depression in veterans. The purpose of this work was to identify the rates and correlates of depression symptoms and to understand mental health care utilization and depression management during pregnancy in women veterans receiving care within the VHA healthcare system, within the context of VA guidelines in Handbook 1330.03.[4] Our specific study objectives and questions were:

Aim 1: To examine rates of perinatal depression symptoms in pregnant veterans.

- What is the prevalence of depression symptoms in a sample of pregnant veterans?
- What proportion of our sample has an EPDS ≥10?
- What patient-level correlates are associated with an EPDS ≥10?

Aim 2: To evaluate the rate of mental health care treatment utilization during pregnancy and to understand the experience and management of depression in a sample of pregnant veterans.

- Are veterans with a past history of depression more likely to utilize mental health care, either through psychiatric visits or antidepressant use, during pregnancy?
- What decisions do women veterans make regarding antidepressant use during pregnancy?
- Do pregnant veterans discuss medication risks with their providers to help make decisions regarding antidepressant use during pregnancy?

Aim 3: To explore the experiences of VHA mental health providers within the context of policy recommendations for seamless care coordination and treatment management for pregnant and postpartum veterans.

- What is a typical care experience for women veterans with perinatal depression?
- Is care coordination for pregnant and postpartum veterans occurring between VHA mental health providers and other VHA providers? Is care coordination occurring between VHA mental health providers and non-VHA obstetricians?
- Does care coordination promote consistent care for pregnant and postpartum veterans with mental health conditions?

- How do providers approach antidepressants and treatment options for pregnant and postpartum veterans with depression symptoms?

SUMMARY OF FINDINGS

In Aims 1 and 2, our analyses utilized survey data from telephone interviews conducted with pregnant veterans enrolled in the COMFORT study. In Aim 1, we found that 28% of our sample showed depression symptoms (EPDS ≥10) during pregnancy. Our final multivariable logistic regression model indicated that veterans having spousal or partner support during pregnancy decreased odds of an EPDS ≥10 by 65% compared to veterans reporting no spousal or partner support. Veterans reporting being employed reduced the odds of an EPDS ≥10 by 60% compared to those reporting being unemployed, a homemaker, or a student. A past diagnosis of anxiety, any antidepressant use, and history of active duty service all resulted in increased odds of an EPDS ≥10. The prevalence of depression in our sample was found to be greater than the high end of prevalence estimates in the general pregnant population.[8,14]

In Aim 2, we found that in general, rates of care were promising with nearly 70% of women veterans with an EPDS ≥10 receiving at least one mental health visit or psychotropic prescription during pregnancy. This finding suggests that mental health care is available and accessible for pregnant veterans. However, symptomatic women without a past diagnosis of depression were less likely to receive care (either mental health visits or antidepressant prescriptions) during pregnancy. This highlights the need for depression screening and established referral procedures for all pregnant veterans. Additionally, in

this aim we explored qualitative data collected during the COMFORT pregnancy telephone interview on a subset of our sample of pregnant veterans with an EPDS ≥10. We identified themes relevant to mental health medication risk discussions with providers, use of mental health medications during pregnancy, and discontinuation of mental health medications during pregnancy. We found that the experiences of depression and mental health treatment during pregnancy varied. Several participants reported discontinuing medications after discussions of associated risks with providers; however, other participants chose to discontinue medications on their own without a risk/benefit discussion with a provider. Many women reported the challenges of managing depression during pregnancy without medications, either due to their providers requesting they discontinue use or due to their own personal decisions.

In Aim 3, we utilized data from semi-structured interviews conducted with VHA mental health providers. Mental health providers identified an existing gap in diagnosis and care for veterans with new onset depression during pregnancy, who may be missed by mental health providers if screening and referrals are inadequate to engage symptomatic women in treatment. Many mental health providers reported being unsure about standard protocols at their facility for screening, assessment/diagnosis, and referring pregnant veterans with depression symptoms to counseling and other types of care. While mental health providers noted successful care coordination with other VHA providers, specifically through PC-MHI teams, coordination or communication with obstetricians rarely occurred. Several mental health providers expressed openness to antidepressant use during pregnancy, depending on a case-by-case analysis of severity of

illness and assessment of need. Additionally, mental health providers identified areas where care could be improved, including in screening and referral processes. As internal coordination teams are already in place at many VHA facilities, improving access to mental health care via the depression care pathway to improve symptomatology is likely feasible.

IMPLICATIONS

This work is important given the rapid growth in the population of young women veterans and the increase in the receipt of maternity care via the VHA system. Our findings have the potential to influence VHA facility-level improvements and VA policies that enhance prenatal care for women veterans. This study provided an opportunity to establish and refine study methods, such as the use of the EPDS screener and semi-structured interviewing, to be used in similar veteran populations in future research. The findings from this work could be used to form hypotheses and develop objectives for intervention studies designed to improve mental health care for pregnant veterans. Additionally, we outline several important clinical and policy contributions of this work below.

Clinical Implications

This work confirms that a substantial proportion of pregnant veterans experience depression symptoms during their pregnancies. While many of these women receive some form of mental health care from the VHA during pregnancy, this study highlights the need for standardized depression screening among pregnant veterans and identifies

several key risk factors for the development of prenatal depression symptoms. As we showed that nearly 1/3 of our sample experienced EPDS scores ≥10, women veterans of reproductive age could potentially benefit from preventative therapy and interventions targeting perinatal depression awareness, prior to pregnancy onset. During pregnancy, medication discussions with providers should include information regarding non-pharmacologic and pharmacologic treatment options with a balanced risk discussion addressing outcomes associated with untreated and treated disease.

Policy Implications

Our results have the potential to inform policy within the VA. Handbook 1330.03 was implemented to encourage standardized care for pregnant and postpartum veterans through maternity care coordination and targeted care for veterans with comorbid conditions such as depression. We found that many mental health providers felt that the procedures in place at their facilities for depression screening, diagnosis, and referral to treatment could be improved. Routinizing and mandating screening system-wide, along with a better standard of procedures for referral and treatment to mental health providers, could improve care for veterans in the perinatal period.

Recommendations for depression screening as outlined in the VA/DoD guidelines should become standard across all VHA facilities working with pregnant veterans, with screenings conducted with the EPDS or PHQ-9[95] in the first trimester, third trimester, and postpartum for all pregnant women veterans.[29] Allotment of resources for a maternity care coordinator or other designee should be made available for depression screenings

and follow-up with pregnant veterans. Additionally, the person conducting depression screenings should be trained in a referral process to engage symptomatic women in further care as needed.

Once referrals have been made, mental health providers should have access to research and strategies related to treatment planning and medication risk discussions with pregnant women. Standardized questions or discussions related to the risks and benefits of different types of evidence-based depression treatments, either medications or psychotherapy, during pregnancy may help veterans and their providers better communicate and determine the best course of action. Education for mental health providers may also increase their awareness and comfort with treating pregnant veterans with depression. Previous studies have shown that within the context of depression management in a primary care location, shared goal setting between patients and providers, patient education, and more patient follow-up lead to greater improvement in patient health.[96] Improved discussions within the VHA have the potential to lead to more individualized treatment and management plans for depression during pregnancy as well as encourage long-term treatment adherence for women veterans.

When possible, early pregnancy is the ideal time to identify treatment strategies for depression due to changing medication recommendations over the perinatal period and new barriers after delivery.[11,56] As veterans must have a VHA appointment to confirm pregnancy, requiring screening for depression during this visit, identifying risk factors, and proactively providing referrals to mental health providers could help reduce the rates of perinatal depression symptoms in a largely at-risk population. Given that

screeners such as the EPDS can be administered and scored within minutes, these suggestions are reasonable. As we found that women without a history of depression were less likely to receive treatment for depression symptoms during pregnancy, integrating a system such as that developed by the MCPAP for Moms study may benefit both new onset and existing cases of depression.[97,98] This system includes trainings for providers and staff, real-time psychiatric consultations, and linkages with care and support resources that would occur during the initial pregnancy screening appointment. Access to these resources while the veteran is onsite could encourage more fluid care between veterans and mental health providers, especially for veterans without a previous relationship with mental health at their VHA facility.

Recently, policymakers have encouraged engagement with mental health care prior to the development of depression symptoms. The USPSTF issued a draft recommendation in the fall of 2018 that clinicians "provide or refer pregnant and postpartum women who are at increased risk of perinatal depression to counseling interventions."[85] As research indicates that counseling interventions can help improve perinatal depression outcomes, the USPSTF recommends identifying at-risk women, such as women veterans, for perinatal depression counseling early, effectively engaging them with mental health care prior to the presence of symptoms. This recommendation could assuage some of the existing barriers to care during pregnancy, such as stigmas surrounding seeking mental health care, lack of knowledge about depression and depression care during the perinatal period, and concerns about admitting to struggling

during pregnancy or postpartum,[57] if a relationship with a mental health provider is established as a standard of practice within the VHA maternity care program.

STRENGTHS

This dissertation has numerous strengths. For Aims 1 and 2, we included samples of pregnant veterans from VHA facilities in geographically distinct regions of the US. Our analysis of pregnant veterans included a large sample of participants. The COMFORT survey was designed to collect information on a multitude of topics, giving us an adequate pool of potential correlates to perinatal depression to examine. To identify depression symptoms, we utilized the EPDS which has been previously validated for use in pregnant populations.[38] Additionally, we were able to link to electronic health records and VA administrative files to obtain prescription and healthcare utilization data which greatly enriched our COMFORT survey data. We were also able to calculate sensitivity and specificity using information from electronic health records to gain a better understanding of the difference between the self-reported responses in COMFORT and VA medical record information. In addition, our use of a mixed methods approach in Aim 2 to conduct both quantitative and qualitative data analyses provided a variety of perspectives on depression symptom management and mental health care during pregnancy. Our method of collecting qualitative data via semi-structured interviews gave participants flexibility in their responses and allowed conversations to flow naturally for more variability in discussions.

In Aim 3, we conducted interviews with a sample of mental health providers from VHA facilities in geographically distinct regions of the US. We interviewed at least one

participant from every COMFORT site, and two or more mental health providers from 12 out of the 14 COMFORT sites included (86%). Of the eligible mental health providers we contacted, overall participation rate was high, with 73% of the participants we invited to participate completing an interview. The mental health providers we interviewed had an average of ten years experience working in the VHA, suggesting our sample was knowledgeable about their work within the VA system and with veterans. Furthermore, we interviewed a wide variety of mental health providers, including both prescribers and non-prescribers, which gave us a more complete picture of the mental health care pregnant and postpartum veterans are receiving. Our use of semi-structured interviews allowed the conversations to flow more naturally, giving mental health providers the opportunity to discuss thoughts or ideas not necessarily included in the interview guide but nonetheless important to the topic at hand.

LIMITATIONS

We acknowledge that this dissertation also has limitations. In Aims 1 and 2, we utilized results from an EPDS that was only conducted once during pregnancy, and at a varying gestational age among our participants. Likewise, we did not control for the gestational age at administration of EPDS in our analyses which may influence EPDS scores/depression symptoms. Additionally, EPDS cannot be used as a diagnosis tool, only as a means of identifying depression symptomology. With this in mind, we may have underestimated our rates of depression symptoms in this sample. As the overall COMFORT study was designed to examine many facets of pregnancy and pregnancy care rather than specifically focusing on depression, it is possible that women with severe

depression would participate less than healthier women leading to non-response bias from more depressed pregnant veterans. Similarly, women who participated may not have felt comfortable answering the EPDS questions accurately due to social desirability bias if they were concerned about their potential negative responses. This type of response bias would also underestimate our depression symptomology findings. Our use of a telephone survey to obtain data from the pregnant women in our study also introduces inherent biases. Recall bias may occur when responding to questions regarding past medical experiences. However, the EPDS utilizes a short 7-day recall period and our inclusion of electronic health data mitigates some of these concerns.

In Aim 2, it is possible that women started taking an antidepressant or seeing a mental health provider following the prenatal interview, which ranged from 4-39 weeks gestation in our sample, and thus would not be captured in the self-report responses. Our analyses assumed that antidepressant prescriptions were used as prescribed; however, we may have included antidepressant prescriptions filled in very early pregnancy which may have been stopped upon pregnancy confirmation, potentially inflating our estimates of antidepressant use. Along these lines, we limited our focus by only including antidepressant prescriptions in our analysis. We chose to focus on depression symptomology and therefore antidepressant use for this dissertation; however, this potentially excludes a wide range of other mental health medications our participants may have been taking. Contradicting this limitation, our survey included broad questions regarding self-reported receipt of mental health care rather than solely focusing on depression. Women veterans may have reported receiving mental health counseling for

conditions other than depression, potentially biasing our estimates of receipt of mental health counseling. Likewise, mental health visit utilization captured by EHR data was not specific to depression care. However, given our emphasis on women with symptomatic EPDS scores, it is likely that any mental health care they were receiving included discussions on and/or treatment for depression.

We were unable to identify mental health care received during pregnancy from a non-VHA provider, which may explain our low specificity calculations as presented in Aim 2. Given that most discordant cases were due to women self-reporting depression where it was shown absent in the EHR, this could potentially be due to diagnoses outside of VHA care (either before the veteran was eligible VHA care or made by a provider outside of the VHA system). Finally, our findings are likely not generalizable to a broader population outside of English-speaking pregnant veterans receiving their care within the VA medical system.

In Aim 3, we only included the perspectives of mental health providers and were unable to include data from maternity care coordinators, primary care physicians, or non-VA obstetricians. We acknowledge that this limits our scope of understanding of the care pregnant veterans receive at VHA sites. Our sample size was relatively small and is not representative of all VHA mental health providers. Additionally, we were limited to the VHA sites working with the larger COMFORT study and the perspectives of mental health providers at these sites; therefore, these findings cannot be generalized to all VHA medical facilities or mental health providers caring for pregnant and postpartum veterans.

FUTURE RESEARCH DIRECTIONS

This research adds to the sparse existing literature on perinatal depression and treatment among pregnant veterans and highlights the need for additional research. Future studies are needed to better examine the existing rate and timing of depression screenings for pregnant veterans at VHA sites, to clarify the depression screening, diagnosis, and treatment referral process for pregnant veterans, and to more accurately quantify the rate of antidepressant use and medication adherence during pregnancy. Additional research focusing on treatment utilization patterns among pregnant veterans will provide greater insight into the types and prevalence of treatment strategies most often used during pregnancy. This work illuminates what is still needed among pregnant veterans experiencing depression symptoms, especially for at-risk women without a history of depression who may be more likely to slip through existing cracks on the screening/diagnosis/referral to care pathway.

The VHA is a unique healthcare system, that given proper resources, could set up an optimal process of depression screening, management, and treatment for perinatal veterans. As discernable through the issuance of Handbook 1330.03,[4] care for pregnant and postpartum veterans is a priority within the VA. This work and future research may help to inform revised perinatal depression screening and assessment guidelines and encourage a streamlined system to efficiently diagnose and link perinatal women veterans with needed care.

APPENDICES FOR CHAPTER II

Appendix 2.1: Distribution of EPDS Items by Total Score

EPDS Item *"During the past 7 days…"*	**EPDS>=10 n=142**		**EPDS<10 n=359**	
Have you been able to laugh and see the funny side of things?	0.74	0.72	0.07	0.27
0, As much as you always could	56	39.4%	332	92.5%
1, Not quite so much now	68	47.9%	24	6.7%
2, Definitely not so much now	14	9.9%	1	0.3%
3, Not at all	3	2.1%	0	0.0%
Have you looked forward to things with enjoyment?	0.97	0.89	0.14	0.40
0, As much as you ever did	49	34.5%	312	86.9%
1, Rather less than you used to	56	39.4%	43	12.0%
2, Definitely less than you used to	27	19.0%	3	0.8%
3, Hardly at all	9	6.3%	1	0.3%
Have you blamed yourself unnecessarily when things went wrong?	1.96	0.97	0.68	0.87
0, Not at all	17	12.0%	200	55.7%
1, Not very often	18	12.7%	81	22.6%
2, Yes, some of the time	61	43.0%	68	18.9%
3, Yes, most of the time	46	32.4%	9	2.5%
Have you felt anxious or worried for no good reason?	2.48	0.64	0.89	1.00
0, Not at all	3	2.1%	177	49.3%
1, Hardly ever	2	1.4%	64	17.8%
2, Yes, sometimes	61	43.0%	95	26.5%
3, Yes, very often	76	53.5%	22	6.1%
Have you felt scared or panicky for no good reason?	1.62	0.70	0.34	0.66
0, No, not at all	18	12.7%	276	76.9%
1, No, not much	18	12.7%	45	12.5%
2, Yes, sometimes	106	74.6%	38	10.6%
Have things been getting on top of you?	1.73	0.74	0.47	0.68
0, No, you have been coping as well as ever	9	6.3%	225	62.7%
1, No, most of the time you coped quite well	36	25.4%	97	27.0%
2, Yes, sometimes you haven't been coping as well as usual	82	57.7%	33	9.2%
3, Yes, most of the time you have not been able to cope	15	10.6%	2	0.6%
Have you been so unhappy that you have had difficulty sleeping?	1.71	1.05	0.28	0.64
0, No, not at all	25	17.6%	286	79.7%

1, Not very often	28	19.7%	48	13.4%
2, Yes, sometimes	51	35.9%	18	5.0%
3, Yes, most of the time	37	26.1%	6	1.7%
Have you felt sad or miserable?	1.71	0.81	0.32	0.55
0, No, never	10	7.0%	258	71.9%
1, Only occasionally	43	30.3%	87	24.2%
2, Yes, quite often	67	47.2%	12	3.3%
3, Yes, most of the time	22	15.5%	1	0.3%
Have you been so unhappy that you have been crying?	1.42	0.84	0.23	0.46
0, No, never	14	9.9%	282	78.6%
1, Only occasionally	73	51.4%	72	20.1%
2, Yes, quite often	37	26.1%	3	0.8%
3, Yes, most of the time	18	12.7%	1	0.3%
Has the thought of harming yourself occurred to you?	0.41	0.74	0.01	0.12
0, Never	104	73.2%	357	99.4%
1, Hardly ever	19	13.4%	1	0.3%
2, Sometimes	18	12.7%	1	0.3%
3, Yes, quite often	1	0.7%	0	0.0%

Appendix 2.2: Multiple Imputation Methods

Regression models were run using a complete case analysis which included just over 80% of our sample. Most of the missing were for two variables, marital status and service connected disability. We assumed that both of these variables would be MCAR or MAR and not missing based on presence of depression symptoms. However, when comparing missingness, there was a statistically significant difference between the proportion missing marital status by group (15.5% for EPDS>=10 vs. 6.7% for EPDS<10, p=0.002) and for those responding to the question regarding past use of antidepressants (0.0% for EPDS>=10 vs. 3.1% for EPDS<10, p=0.03).

We used PROC MI to impute values for all variables used in our final models ($p<0.05$ in bivariate analyses). This included marital status (n=46 missing), service-connected disability (n=28 missing), past use of antidepressants (n=11 missing), report of military sexual trauma (n=9 missing), and employment (n=1 missing). Additionally, we looked for potential auxiliary variables to include in the imputation calculations, but there were few that were correlated (at a level of $r>0.40$) with our final variables. Several MI calculations were then run:

1. Given our arbitrary missing patterns, we began by using a Markov chain Monte Carlo (MCMC) method with a fully conditional specification (FCS) that assumes the existence of a joint distribution for all variables to impute a monotone pattern, rounding values to maintain categorical nature (i.e., using min/max values of 0/1).

2. Using the above imputed values, we ran a full regression model including all variables and used MIANALYZE to pool the data and examine diagnostics; we then ran a second model using backward selection as we did in our main analysis and then used MIANALYZE again on this output.

References:

1) **https://stats.idre.ucla.edu/sas/seminars/multiple-imputation-in-sas/mi_new_1/**

2) **http://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_mi_sect001.htm**

3) Ratitch B, Lipkovich I, O'Kelly M. Combining Analysis Results from Multiply Imputed Categorical Data. PharmaSUG. 2013; 1–19. Available: **http://pharmasug.org/proceedings/2013/SP/PharmaSUG-2013-SP03.pdf**

4) Berglund P. An Introduction to Multiple Imputation of Complex Sample Data using SAS®. SAS Glob Forum. 2010;2.

Appendix 2.3: Results with Any Mental Health, Depression Excluded

	Logistic Model including all variables p<0.05 in bivariate analyses			Logistic Model with Backward Selection			GLIMMIX - cluster on site w/ variables from final MV model			MI Model 1: FCS with Rounded Values, Full Logistic Model*			MI Model 2: FCS with Rounded Values, Backward Selection		
	AOR	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**
Social Support from Spouse/Partner during Pregnancy (Yes vs. No)	0.42	0.18	0.97	0.37	0.17	0.80	0.33	0.17	0.66	0.37	0.18	0.76	0.36	0.18	0.71
Employed vs. Unemployed / Homemaker / Student / Other	0.42	0.25	0.71	0.41	0.25	0.69	0.50	0.32	0.77	0.51	0.33	0.80	0.48	0.31	0.74
Active Duty vs. National Guard / Reserves / Civilian	1.72	0.96	3.09	1.88	1.06	3.32	1.62	1.01	2.62	1.48	0.89	2.45			
Ever Diagnosis of Any Mental Health	2.60	1.33	5.08	2.82	1.47	5.40	1.71	1.03	2.83	1.59	0.94	2.69	1.74	1.03	2.92

Condition, excluding depression (Yes vs. No)															
Ever Antidepressant Prescription Prior to Pregnancy (Yes vs. No)	2.78	1.15	5.43	3.11	1.61	5.99	3.63	2.10	6.26	2.99	1.70	5.26	2.99	1.72	5.22
Marital Status (Married vs. Not Married)	0.87	0.50	1.52							0.94	0.56	1.57			
Race (White vs. Non-White)	0.70	0.41	1.17							0.58	0.37	0.91	0.56	0.36	0.87
Service-Connected Disability (Yes vs. No)	1.81	0.74	4.42							1.75	0.84	3.65			
Any Military Sexual Trauma (Yes vs. No)	1.12	0.64	1.94							1.64	1.00	2.67	1.76	1.09	2.84
Ever Treatment for Drug Abuse or Alcoholism (Yes vs. No)	1.70	0.74	3.89							1.50	0.73	3.06			

Hosmer-Lemeshow Goodness of Fit	p=0.7894	p=0.8898			

Appendix 2.4: Results with Any Mental Health, Depression Included

	Logistic Model including all variables p<0.05 in bivariate analyses			Logistic Model with Backward Selection			GLIMMIX - cluster on site w/ variables from final MV model			MI Model 1: FCS with Rounded Values, Full Logistic Model*			MI Model 2: FCS with Rounded Values, Backward Selection		
	AOR	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**	**AOR**	**Lower 95% CI**	**Upper 95% CI**
Social Support from Spouse/Partner during Pregnancy (Yes vs. No)	0.39	0.17	0.90	0.35	0.16	0.75	0.33	0.17	0.65	0.37	0.18	0.76	0.36	0.18	0.71
Employed vs. Unemployed/ Homemaker/ Student/Other	0.41	0.24	0.68	0.40	0.24	0.67	0.49	0.32	0.76	0.51	0.33	0.80	0.48	0.31	0.74
Active Duty vs. National Guard/Reserves/Civilian	1.77	0.99	3.16	1.95	1.11	3.44	1.61	0.99	2.60	1.48	0.89	2.45			
Ever Antidepressant Prescription Prior to Pregnancy	2.40	1.15	5.03	2.69	1.31	5.52	2.84	1.54	5.25	2.99	1.70	5.26	2.99	1.72	5.22

(Yes vs. No)														
Ever Diagnosis of Any Mental Health Condition, including depression (Yes vs. No)	3.02	1.10	8.28	3.51	1.32	9.37	2.56	1.17	5.60	1.59	0.94	2.69	1.74	1.03	2.92
Marital Status (Married vs. Not Married)	0.83	0.48	1.45							0.94	0.56	1.57			
Race (White vs. Non-White)	0.75	0.45	1.25							0.58	0.37	0.91	0.56	0.36	0.87
Service-Connected Disability (Yes vs. No)	2.01	0.83	4.86							1.75	0.84	3.65			
Any Military Sexual Trauma (Yes vs. No)	1.14	0.66	1.97							1.64	1.00	2.67	1.76	1.09	2.84
Ever Treatment for Drug Abuse	1.66	0.73	3.74							1.50	0.73	3.06			

or Alcoholism (Yes vs. No)															
Hosmer-Lemeshow Goodness of Fit	p=0.8158			p=0.7747											

Appendix 2.5: Results with Any Mental Health, Depression Separate

	Logistic Model including all variables p<0.05 in bivariate analyses			Logistic Model with Backward Selection			GLIMMIX - cluster on site w/ variables from final MV model			MI Model 1: FCS with Rounded Values, Full Logistic Model*			MI Model 2: FCS with Rounded Values, Backward Selection		
	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI
Social Support from Spouse/Partner during Pregnancy (Yes vs. No)	0.43	0.19	1.00	0.37	0.17	0.80	0.33	0.17	0.66	0.40	0.19	0.83	0.37	0.18	0.72
Employed vs. Unemployed/ Homemaker/ Student/Other	0.43	0.25	0.72	0.41	0.25	0.69	0.50	0.32	0.77	0.53	0.33	0.83	0.50	0.32	0.78
Active Duty vs. National Guard/Reserves/Civilian	1.72	0.96	3.09	1.88	1.06	3.32	1.62	1.01	2.62	1.50	0.90	2.49	1.66	1.01	2.71
Ever Diagnosis of Any Mental Health Condition, excluding	2.48	1.27	4.85	2.82	1.47	5.40	1.71	1.03	2.83	1.52	0.89	2.58	1.72	1.02	2.89

depression (Yes vs. No)															
Ever Antidepressant Prescription Prior to Pregnancy (Yes vs. No)	2.26	1.08	4.74	3.11	1.61	5.99	3.63	2.10	6.26	2.39	1.26	4.53	2.88	1.57	5.29
Marital Status (Married vs. Not Married)	0.92	0.52	1.61							0.87	0.51	1.50			
Race (White vs. Non-White)	0.71	0.42	1.19							0.60	0.39	0.95	0.58	0.37	0.91
Service-Connected Disability (Yes vs. No)	1.82	0.74	4.46							1.51	0.69	3.29			
Any Military Sexual Trauma (Yes vs. No)	1.08	0.62	1.88							1.53	0.93	2.51	1.79	1.12	2.88
Ever Depression Diagnosis (Yes vs. No)	1.56	0.77	3.17							1.65	0.89	3.06	1.86	1.02	3.40

Ever Treatment for Drug Abuse or Alcoholism (Yes vs. No)	1.60	0.70	3.66							1.41	0.69	2.89			
Hosmer-Lemeshow Goodness of Fit	p=0.8787			p=0.8898											

Appendix 2.6: Results with Mental Health Conditions as Separate Variables

	Logistic Model including all variables p<0.05 in bivariate analyses			Logistic Model with Backward Selection			GLIMMIX - cluster on site w/ variables from final MV model			MI Model 1: FCS with Rounded Values, Full Logistic Model*			MI Model 2: FCS with Rounded Values, Backward Selection		
	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI
Social Support from Spouse/Partner during Pregnancy (Yes vs. No)	0.41	0.18	0.98	0.35	0.16	0.77	0.32	0.16	0.64	0.39	0.19	0.83	0.35	0.18	0.71
Employed vs. Unemployed/ Homemaker/ Student/Other	0.42	0.25	0.71	0.40	0.24	0.67	0.49	0.32	0.76	0.54	0.34	0.85	0.47	0.30	0.73
Active Duty vs. National Guard/Reserves/Civilian	1.71	0.95	3.07	1.91	1.08	3.37	1.62	1.00	2.60	1.48	0.89	2.46			
Ever Anxiety Diagnosis (Yes vs. No)	2.14	1.16	3.93	2.54	1.43	4.50	1.68	1.05	2.71	1.32	0.79	2.22			

Ever Antidepressant Prescription Prior to Pregnancy (Yes vs. No)	2.33	1.09	5.00	3.27	1.71	6.24	3.61	2.09	6.25	2.31	1.20	4.46	2.59	1.40	4.82
Marital Status (Married vs. Not Married)	0.91	0.52	1.61							0.91	0.54	1.55			
Race (White vs. Non-White)	0.74	0.44	1.25							0.61	0.39	0.95	0.60	0.39	0.93
Service-Connected Disability (Yes vs. No)	1.92	0.78	4.72							1.67	0.76	3.67	2.20	1.05	4.60
Any Military Sexual Trauma (Yes vs. No)	1.11	0.64	1.94							1.58	0.97	2.58	1.73	1.07	2.77
Ever Treatment for Drug Abuse or Alcoholism (Yes vs. No)	1.56	0.68	3.59							1.32	0.64	2.72			

Ever Depression Diagnosis (Yes vs. No)	1.41	0.68	2.93							1.51	0.80	2.84	1.84	1.00	3.39
Ever PTSD Diagnosis (Yes vs. No)	1.10	0.62	1.97							1.17	0.71	1.93			
Ever Mood Disorder Diagnosis (Yes vs. No)	1.19	0.58	2.43							1.37	0.71	2.64			
Ever Bipolar Disorder Diagnosis (Yes vs. No)	0.90	0.35	2.30							0.93	0.40	2.16			
Hosmer-Lemeshow Goodness of Fit	p=0.8028			p=0.8338											

Appendix 2.7: Results combining Ever Depression Diagnosis or Antidepressant Prescription

	Logistic Model including all variables p<0.05 in bivariate analyses			Logistic Model with Backward Selection			GLIMMIX - cluster on site w/ variables from final MV model			MI Model 1: FCS with Rounded Values, Full Logistic Model*			MI Model 2: FCS with Rounded Values, Backward Selection		
	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI	AOR	Lower 95% CI	Upper 95% CI
Social Support from Spouse/Partner during Pregnancy (Yes vs. No)	0.41	0.17	0.95	0.30	0.14	0.66	0.28	0.14	0.56	0.38	0.18	0.79	0.34	0.17	0.67
Employed vs. Unemployed/ Homemaker/ Student/Other	0.42	0.25	0.71	0.36	0.22	0.60	0.41	0.26	0.63	0.54	0.35	0.86	0.48	0.31	0.75
Active Duty vs. National Guard/Reserves/Civilian	1.58	0.89	2.83							1.37	0.83	2.26			
Ever Anxiety Diagnosis (Yes vs. No)	2.26	1.22	4.19	2.57	1.43	4.63	2.13	1.28	3.55	1.40	0.83	2.35	1.67	1.02	2.72

Ever Depression Diagnosis or Antidepressant Prescription	2.49	1.10	5.68	2.90	1.34	6.26	2.88	1.49	5.55	2.67	1.34	5.32	3.54	1.84	6.80
Marital Status (Married vs. Not Married)	0.87	0.50	1.52							0.93	0.55	1.59			
Race (White vs. Non-White)	0.75	0.45	1.26							0.61	0.39	0.96	0.60	0.39	0.93
Service-Connected Disability (Yes vs. No)	2.00	0.82	4.88	2.43	1.03	5.78	2.05	0.97	4.34	1.73	0.81	3.70	2.32	1.11	4.87
Any Military Sexual Trauma (Yes vs. No)	1.11	0.64	1.95							1.56	0.95	2.56	1.70	1.05	2.75
Ever Treatment for Drug Abuse or Alcoholism (Yes vs. No)	1.55	0.67	3.54							1.35	0.66	2.76			

Ever PTSD Diagnosis (Yes vs. No)	1.26	0.72	2.21							1.29	0.79	2.10			
Ever Mood Disorder Diagnosis (Yes vs. No)	1.25	0.62	2.53							1.45	0.76	2.75			
Ever Bipolar Diagnosis (Yes vs. No)	0.98	0.39	2.50							1.02	0.44	2.36			
Hosmer-Lemeshow Goodness of Fit	p=0.7453			p=0.6068											

APPENDICES FOR CHAPTER III

Appendix 3.1: List of Stop Codes used in Identifying Mental Health Visits during Prepregnancy and Pregnancy

Mental Health Care Stop Codes*	143, 165, 207, 213, 292, 501, 502, 503, 504, 505, 506, 510, 511, 515, 516, 520, 521, 522, 524, 525, 526, 527, 528, 529, 530, 531, 532, 535, 536, 537, 538, 540, 541, 542, 546, 550, 551, 552, 553, 554, 557, 558, 559, 561, 562, 563, 564, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 589, 590

**Does not include visits for alcohol, drug, or other substance abuse treatment.*

Appendix 3.2: List of Antidepressants* Included in Definition of Antidepressant Receipt during Prepregnancy and Pregnancy

Selective serotonin reuptake inhibitors (SSRIs)	citalopram, Celexa, Cipramil, escitalopram, Lexapro, Cipralex, Seroplex, Lexamil, fluoxetine, Prozac, Sarafem, Symbyax, fluvoxamine, Luvox, paroxetine, Paxil, Aropax, sertraline, Zoloft
Serotonin–norepinephrine reuptake inhibitors (SNRIs)	desvenlafaxine, Pristiq, duloxetine, Cymbalta, milnacipran, Ixel, venlafaxine, Effexor
Tricyclic Antidepressants (TCAs)	amitriptyline, Elavil, Endep, clomipramine, Anafranil, doxepin, Adapin, Sinequan, imipramine, Tofranil, trimipramine, Surmontil, desipramine, Norpramin, nortriptyline, Pamelor, Aventyl, Noritren, protriptyline, Vivactil
Monoamine Oxidase Inhibitors (MAOIs)	isocarboxazid, Marplan, moclobemide, Aurorix, Manerix, phenelzine, Nardil, selegiline, Eldepryl, Emsam, tranylcypromine, Parnate
Other antidepressants**	mianserin, Tolvon, mirtazapine, Remeron, Avanza, Zispin, bupropion, Wellbutrin, Zyban, tianeptine, Stablon, Coaxil, Tatinol, agomelatine, Valdoxan, Melitor, Thymanax

**Note: Search terms included generic and brand names as listed.; **Noradrenergic and specific serotonergic antidepressants (NASSA); norepinephrine-dopamine reuptake inhibitors (NDRI); bupropion; selective serotonin reuptake enhancers (SSRE); tianeptine; norepinephrine-dopamine disinhibitors (NDDI); agomelatine*

Appendix 3.3: Semi-Structured Interview Guide

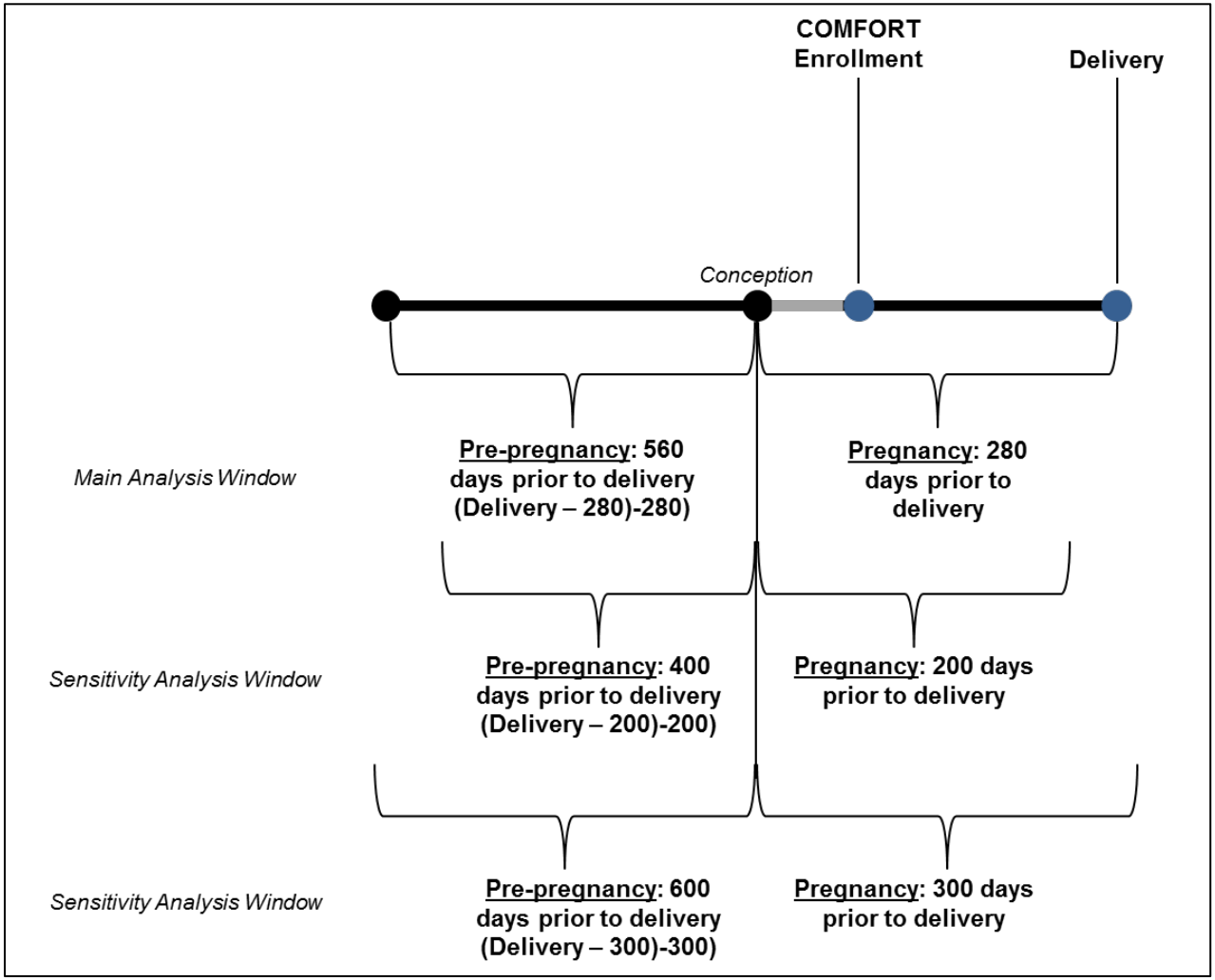
Next, I would like to ask you some more details regarding your care. I know that we discussed these points earlier, but any additional thoughts or comments that you could offer would be appreciated. Again, your comments will remain anonymous.

1. To the best of your knowledge, has there been any communication between your VHA providers (medical or mental health) and obstetrical providers during your pregnancy?
    a. If yes, what was the nature of this communication?
2. Have you experienced any mental health concerns or depression during your pregnancy?
    a. Has the VHA helped you address these needs? If so, how?
    b. Has your OB helped you address these needs? If so, how?
3. Were you taking any medications in the months prior to, or currently, during your pregnancy? This could be for mental health concerns, pain management, or other health conditions.
    a. Is your OB aware of all of these medications?
4. Did you make any changes to your mental health medications once you became pregnant? If so, why?
5. Did the MH provider discuss with you the risks associated with medications and pregnancy?
    a. Did your VA provider?
    b. Did your OB?

If the Veteran answered “Yes” to the MST questions:

6. You had previously indicated you had experienced MST. Could you talk more about this experience? Specifically, has your experience with MST shaped (or influenced) your views or experiences with pregnancy or childbirth?
    a. If yes, in what ways?

Appendix 3.4: Time Periods of Mental Health Care/Antidepressant Prescription Identification from VA Electronic Health Records used in Main and Sensitivity Analyses



Appendix 3.5: Results from Sensitivity Analyses Varying the Pregnancy Time Window (at 200, 280, and 300 Days)

Appendix 3.5.1: Care Utilization among Veterans with Depressive Symptoms Before & During Pregnancy, 200, 280, and 300 Day Comparisons with VA Corporate Data Warehouse (CDW) Electronic Health Record Data (n=135)

	200-day window	280-day window*	300-day window
Mental Health visits, mean +/- SD (range)			
Pre-pregnancy	4.0 +/- 6.6 (0-33)	5.3 +/- 9.1 (0-45)	5.7 +/- 9.7 (0-52)
Pregnancy	4.5 +/- 7.2 (0-43)	6.1 +/- 9.4 (0-54)	6.6 +/- 10.0 (0-57)
Any Mental Health visits, n (%)			
Pre-pregnancy	76 (56.3)	79 (58.5)	79 (58.5)
Pregnancy	82 (60.7)	91 (67.4)	93 (68.9)
Antidepressant Prescription, n (%)			
Pre-pregnancy	57 (42.2)	57 (42.2)	67 (49.6)
Pregnancy	29 (21.5)	50 (37.0)	54 (40.0)
Any VHA Mental Health Care during Pregnancy (1+ mental health visit or antidepressant prescription in VA CDW EHR) (N, %)	86 (63.7)	99 (73.3)	99 (73.3)

**Main analysis results.*

Time period definitions:
200 days: Pre-pregnancy=(Newborn date of birth-200)-200; Pregnancy=Newborn date of birth-200
280 days: Pre-pregnancy=(Newborn date of birth-280)-280; Pregnancy=Newborn date of birth-280
300 days: Pre-pregnancy=(Newborn date of birth-300)-300; Pregnancy=Newborn date of birth-300

Note: 7 of our participants (n=1 with no past depression; n=6 with past depression) did not have CDW data; therefore this analysis was conducted in 135 participants.

Appendix 3.5.2: Care Utilization among Veterans with Depressive Symptoms Before & During Pregnancy, 200 Day and 280 Day Comparisons with VA Corporate Data Warehouse (CDW) Electronic Health Record Data (n=135)

	200-day window	280-day window*	P-value**
Mental Health visits, mean +/- SD (range)			
Pre-pregnancy	4.0 +/- 6.6 (0-33)	5.3 +/- 9.1 (0-45)	0.01
Pregnancy	4.5 +/- 7.2 (0-43)	6.1 +/- 9.4 (0-54)	<.0001
Any Mental Health visits, n (%)			
Pre-pregnancy	76 (56.3)	79 (58.5)	0.56
Pregnancy	82 (60.7)	91 (67.4)	0.003
Antidepressant Prescription, n (%)			
Pre-pregnancy	57 (42.2)	57 (42.2)	-
Pregnancy	29 (21.5)	50 (37.0)	<.0001
Any VHA Mental Health Care during Pregnancy (1+ mental health visit or antidepressant prescription in VA CDW EHR) (N, %)	86 (63.7)	99 (73.3)	0.0003

**Main analysis results.*
***Wilcoxon signed rank test for continuous comparisons; McNemar's test for comparisons of proportions.*

Time period definitions:
200 days: Pre-pregnancy=(Newborn date of birth-200)-200; Pregnancy=Newborn date of birth-200
280 days: Pre-pregnancy=(Newborn date of birth-280)-280; Pregnancy=Newborn date of birth-280
300 days: Pre-pregnancy=(Newborn date of birth-300)-300; Pregnancy=Newborn date of birth-300

Note: 7 of our participants (n=1 with no past depression; n=6 with past depression) did not have CDW data; therefore this analysis was conducted in 135 participants.

Appendix 3.5.3: Care Utilization among Veterans with Depressive Symptoms Before & During Pregnancy, 280 Day and 300 Day Comparisons with VA Corporate Data Warehouse (CDW) Electronic Health Record Data (n=135)

	280-day window*	**300-day window**	**P-value****
Mental Health visits, mean +/- SD (range)			
Pre-pregnancy	5.3 +/- 9.1 (0-45)	5.7 +/- 9.7 (0-52)	0.01
Pregnancy	6.1 +/- 9.4 (0-54)	6.6 +/- 10.0 (0-57)	<.0001
Any Mental Health visits, n (%)			
Pre-pregnancy	79 (58.5)	79 (58.5)	-
Pregnancy	91 (67.4)	93 (68.9)	0.16
Antidepressant Prescription, n (%)			
Pre-pregnancy	57 (42.2)	67 (49.6)	0.01
Pregnancy	50 (37.0)	54 (40.0)	0.05
Any VHA Mental Health Care during Pregnancy (1+ mental health visit or antidepressant prescription in VA CDW EHR) (N, %)	99 (73.3)	99 (73.3)	-

**Main analysis results.*
***Wilcoxon signed rank test for continuous comparisons; McNemar's test for comparisons of proportions.*

Time period definitions:
200 days: Pre-pregnancy=(Newborn date of birth-200)-200; Pregnancy=Newborn date of birth-200
280 days: Pre-pregnancy=(Newborn date of birth-280)-280; Pregnancy=Newborn date of birth-280
300 days: Pre-pregnancy=(Newborn date of birth-300)-300; Pregnancy=Newborn date of birth-300

Note: 7 of our participants (n=1 with no past depression; n=6 with past depression) did not have CDW data; therefore this analysis was conducted in 135 participants.

APPENDICES FOR CHAPTER IV

Appendix 4.1. Semi-Structured Interview Guide

1. To start, could you describe your current position in the VA? What are your responsibilities? How long have you been there? Are you situated directly in the women's clinic or elsewhere? Do you primarily work in the main hospital or are you at a CBOC?
2. I am specifically interested in mental health care during the perinatal period. How often do you work with women before, during, or after pregnancy?
    a. Prompt: When do you typically first see women Veterans? Could you provide an example of a common situation working with women during the perinatal time?
3. In your experience, do most pregnant Veterans leave the VA entirely during their pregnancies, or do some Veterans continue to receive VA care for certain conditions? Can you tell me more about the types of conditions that require ongoing care?
    a. Prompt: In general, how are women Veterans doing during and after pregnancy? What are some of the issues or problems they are struggling with?
    b. Prompt: In general, can you identify any resources that women Veterans need, but don't have, in their first year of motherhood?
    c. Prompt: When working with postpartum Veterans, do you have any standard questions you ask to assess any unmet needs regarding parenting or specific needs of their infants?
    d. Prompt: If a woman were struggling with parenting issues or issues related to her infant, would you know what resources to offer them or where to refer them for help?
4. Regarding medication use during pregnancy, are you aware of anyone at your facility who routinely reviews medications for women who are newly pregnant or during pregnancy? Do you know if there is any type of safety planning done with pregnant women on medication use in the perinatal period?
5. I am also interested in learning more about care coordination for pregnant Veterans.
    a. Prompt: To what degree do you communicate with a woman Veteran's obstetrician? In general, do you have any contact with that person during the pregnancy?
    b. Prompt: Is there any communication among VA providers during a woman's pregnancy with regard to her medical conditions as they relate to pregnancy?
6. Are you aware of any VA guidelines or protocols that discuss care for pregnant women? Do you have a general approach to caring for pregnant women, such as a specific protocol or set of practices that you follow?

a. Prompt: Are you aware of any VA resources or training for mental health providers on treating perinatal depression?

    i. Were you able to attend the 2016 Women's Mental Health Mini-Residency? If so, did you attend sessions regarding perinatal mental health issues?

    ii. Did you participate in the Women's Mental Health Prescriber Teleconference Series? Was pregnancy discussed during these meetings?

    iii. Are you aware of the Women's Health Services reproductive mental health training curriculum?

b. Prompt: Does your facility conduct routine depression screening for pregnant Veterans that receive care at your VA? Are you aware of any formal VA guidelines on depression screening?

7. In your opinion, does your facility provide sufficient resources and staff to support women during the perinatal period?

    a. Prompt: In general, have you felt that your facility is supportive of pregnancy care and/or maternity care? Can you tell me why you have found them supportive, or not? Can you give me specific examples of their support, or lack thereof?

    b. Prompt: In your perspective, is there anything that could be improved in terms of the mental health care of pregnant women in the VA?

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